CHEMICAL & METALLURGICAL ENGINEERING

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CHEMICAL & METALLURGICAL ENGINEERING

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James H. McGraw, *President*
E. J. Mehren, *Vice-President*

H. C. Parmelee
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Chemical & Metallurgical Engineering

is the successor to *Metallurgical & Chemical Engineering*, which, in turn, was a consolidation of *Electrochemical & Metallurgical Industry* and *Iron & Steel Magazine* effected in July, 1906.

The magazine was originally founded as *Electrochemical Industry*, in September, 1902, and was published monthly under the editorial direction of Dr. E. F. Roeber. It continued under that title until January, 1905, when it was changed to *Electrochemical & Metallurgical Industry*. In July, 1906, the consolidation was made with *Iron & Steel Magazine*, that had been founded 8 years previously by Dr. Albert Sauveur. In January, 1910, the title was changed to *Metallurgical & Chemical Engineering*, and semi-monthly publication was begun Sept. 1, 1915. On July 1, 1918, the title was changed to *Chemical & Metallurgical Engineering*, and weekly publication was begun Oct. 1, 1919.

Dr. E. F. Roeber was editor of the paper from the time it was founded until his death on Oct. 17, 1917. After a brief interim he was succeeded by H. C. Parmelee.

The staff of *Chemical & Metallurgical Engineering* comprises: H. C. Parmelee, editor; Charles Wadsworth, 3d, managing editor; A. W. Allen, Henry M. Batters, Charles N. Hulburt, Sidney D. Kirkpatrick, R. S. McBride, Graham L. Montgomery, Hans H. Wanders and Alan G. Wikoff, assistant editors; Clifford B. Bellis and Harold J. Payne, editorial assistants.

The 2 Per Cent Law And Labor-Saving Machinery

ON MANY recent occasions, in these columns and elsewhere, it has been pointed out how the Congressional restrictions on immigration increased the necessity for the substitution of labor-saving equipment for hand labor. If this has been so in the past, it will be even more so in the future. For it will be recalled that, just prior to adjournment, the last session of Congress passed a new law, restricting immigration, changing the basis of quotas for admission from 3 per cent of the nationality representation as shown by the 1910 census to 2 per cent of the representation shown by the 1890 census.

This new law not only considerably decreases the total number of immigrants that may enter the country; it does at least one other significant thing. Congress, in going back to the 1890 census, had a very definite object in view. It was desired to increase relatively the number of immigrants from northwestern Europe as compared with those from any other portion of Europe. This is certainly accomplished by the law—most of the countries that recently gave us the bulk of our newcomers will henceforth give us next to none.

While the motives actuating Congress were of a social nature, industry is to feel the effect in such a way as to increase greatly the need for a widespread use of labor-saving equipment. For the immigrant from northwestern Europe is, industrially speaking, a superior man. Not only is he often skilled in a trade when he arrives but he is also generally rather well educated. It is obvious that such a man is not going to be content as industry's beast of burden. The rougher, unskilled jobs will not appeal to him. He will demand work commensurate with his abilities.

If, then, industry is not going to be able to look to immigration for a supply of unskilled labor, where shall it look? Nowhere. For the unskilled labor supply at present available is rapidly decreasing through education of the workers and return of many to their former homes. Obviously, the industrial management that desires to continue to function must replace unskilled labor by machines. And the sooner it makes this change the better will be its position relative to other industrial organizations.

Eliminating a Common Danger

PLANT superintendents responsible for the handling of flammable liquids will find some intensely interesting as well as valuable suggestions in Carl Haner's discussion in this issue of the control of static and stray currents. This ever-present source of danger makes its appearance under varying circumstances and over a wide range of chemical engineering industries. Principally we find it in the production of petroleum distillates, benzol and coal-tar products, alcohol, ether and similar solvents; but its dangers are even more pronounced in the use of these products by the industries that make explosives, dyes, pyroxylin plastics, picture films, artificial silk, leather, varnish and lacquers. In the past costly experience has necessarily been the teacher in many plants, and it is only recently that a number of progressive trade organizations have undertaken to bring this information to the attention of their industries.

Of the two sources of danger—static and stray currents—the former is more familiar and better controlled in most plants, yet stray currents from electric railways and high-tension lines are sometimes considerably more dangerous. While proper grounding of belts and pulleys, equipment and buildings will usually take care of static, stray currents can be avoided only by most efficient insulation, by breaking every circuit in which current can enter the plant. Mr. Haner's example of the railroad spur that crosses the trolley track is a common source of danger. It is a serious one, too, because of its close relation to the loading and unloading of the tank cars that bring volatile solvents, fuel and

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other flammable materials into the plants. The use of standard insulation joints in the railroad track together with a thorough system of grounding such as that employed by the Standard Oil Company of California is the only safe practice under these conditions.

Another warning we can well observe is in connection with the handling of gases and flammable vapors. The friction of a rapidly moving gas is an effective generator of static and can and often does result in a disastrous spark that will ignite an explosive mixture or set fire to a flammable liquid.

The control of static is so broad and complicated a subject, however, that no single discussion can exhaust its possibilities. *Chem. & Met.'s* readers whose contact with similar problems in their own plants has suggested precautions applicable to other industries are urged to contribute their share to the common fund of operating experience. Free interchange of information of this sort is of incalculable value.

Government Gives Battle To the Oil Industry

COMING at a time when wholesale indictment and political condemnation are the order of the day, the government's suit in equity against fifty leading oil refiners is likely to be regarded in some quarters as merely another of the daily shake-ups of the politician's kaleidoscope. But it is considerably more than that. It is the first outbreak of a siege for which the Federal Trade Commission and the Department of Justice have made long preparation. It marks the beginning of what promises to be a long-drawn-out battle and one in which technology is destined to take an important part.

Robbed of its sensational headlines and involved legal verbiage, the Attorney-General's suit charges that five principal refiners entered into a conspiracy to restrain trade by recognizing the validity of one another's patents on cracking processes and on the basis of this agreement proceeding to exact royalties from forty-four other refiners who chose to license these patents. In this agreement the government not only saw an illegal restraint to production and distribution but apparently the Attorney-General was convinced that the guilty parties were extorting huge sums of money from other refiners under the guise of royalties on patents of questionable value. A part of Mr. Stone's charge was that the defendants' alleged patents covered only "minor improvements so insignificant as to afford no consideration for contracts in restraint of trade." It is for the courts to decide just how valuable the principal cracking patents really are, but it is at least significant to recall that for a number of years this particular question has been the subject of several suits, no one of which has yet reached a decision. In the meantime tedious trials, with costly marshaling of legal advice and expert testimony, have been paid for by the petroleum industry. This waste of time and money has been so discouraging as to make the average refiner welcome a satisfactory licensing arrangement at any reasonable fee. And this is particularly true because economic conditions have made it absolutely necessary for the refiner to adopt the cracking process in order to supply the enormously increased demands of the users of motor fuel.

The government declares that the agreement would stop all parties involved from testing the validity of the asserted patent rights. This is an important point perhaps from a theoretical viewpoint, but is rather questionable as a matter of hard-headed business policy. In a period of development in which a complicated patent situation cast a gloomy cloud over the whole industry, there was a need for quicker—if not surer—action than was offered by slow-moving legal procedure. Gasoline production and consumption could not be suspended while lawyers and technologists matched their wits over matters of patent priority. Furthermore, even when the companies agreed among themselves to call a halt in contesting litigation, there continued to be suits by other refiners desiring to establish the validity of their own patents and processes.

With these facts as background and supported by the best of legal advice, the companies entered into the agreement with their eyes open. In drawing up their arrangements with licensing companies they had as a precedent the contracts of the Standard Oil Co. of Indiana under which the Burton process had come into general use over the entire country. Many of these licenses had been in effect for practically a decade, during which time they had never been questioned by the courts and had been generally regarded as fair and equitable by the industry. Some of the trade restrictions entering into the more recent licenses, however, will doubtless form the principal bones of contention between the government and the industry. Their review by the courts should do much to clarify contractual relations in other lines of business and will therefore be welcomed not only by the refiners but by industry in general.

The court's solution of the more technical problems involved in evaluating the patents on the several commercial cracking processes will be watched with genuine interest by chemists and engineers. The subject is one of basic importance, for it represents modern technology's greatest single contribution to the petroleum industry. To bring to it the public recognition it deserves would be one desirable result of the otherwise discouraging legal battle.

Try and Do It

WE ALWAYS get a thrill out of the work of the rebel who does something that everyone knows cannot be done. Probably the greatest single obstacle to scientific progress is the well-established knowledge that certain things cannot be done. We all knew that steel containing 0.1 per cent carbon could not be greatly strengthened by heating and quenching—until R. H. Smith explained to the recent meeting of the A.S.T.M. at Atlantic City that if a great enough volume of cooling water is brought into contact with the heated steel the breaking strength can be increased threefold—to 130,000 lb. per sq.in.!

After all it was reasonable to expect this. We knew that the more rapidly low-carbon steel was cooled the more it was stiffened. But we also knew that this stiffening was slight and that it was impossible to strengthen low-carbon steel very much—that is, until a man who took the theory of heat transfer seriously realized that it was not impossible.

Mr. Smith in his work discovered many enlightening facts about mild steel, but important though these discoveries are, they are no more significant than the lesson he unwittingly teaches, and the text he did not consciously take: "Perhaps it cannot be done, but why not make a real try in the light of common sense and modern learning?"

Getting Down To Fundamentals

IN OUR freshman chemistry days two ways were in vogue for approaching this interesting, yet refractory, subject. The choice of the cook-book chemist was to learn by rote many complicated and apparently unrelated facts. On the other hand, some of our classmates with a real interest in chemistry had a way of scratching around a bit beneath the surface in order to identify and correlate certain fundamental facts underlying theory and practice. Our later contact with many technical men has convinced us that both species are still extant. We all know, for example, the man who regards with reverence a tentative standard testing method of the A.S.T.M. and to whom the established procedure of the accepted standard carries with it the authority of Holy Writ.

Every right-thinking engineer, who deprecates the latter attitude, will welcome the positive action of the executive committee of the American Society for Testing Materials in declaring that the society's immediate future must emphasize the promotion of fundamental knowledge of materials.

This is not a new bend in the activities of this organization, however, for its systematic work in correlating the behavior and properties of materials has always been based on thorough research of a most fundamental nature. Admittedly in the past there has been a tendency, and necessarily so, to lay most emphasis on specifications and methods of testing. But after all, these are only the immediate byproducts of information that has a much greater utility. Broader, fundamental knowledge will ultimately mean improvement in quality and performance and the development of new and better engineering materials.

New Uses for Copper Sulphate

A REVIEW of comparatively recent developments in the use of such a familiar material as copper sulphate prompts us to a realization of the tremendous possibilities in the extended utilization of the products of chemical engineering, and the systematization of manufacture in consequence of the increased demand.

The importance of efficient grounding of high-tension electrical equipment had long been realized by the electrical industry, but it remained for the Southern California Edison Co. to bring about some interesting changes in methods and materials. Experimentation demonstrated the superiority of copper sulphate over common salt in the composition of the mixture surrounding the copper ground plates. When an investigation was started in 1923, it was recognized that copper sulphate possessed a much higher solubility rate than salt, and that a correspondingly greater conducting area would be secured by its use. However, the cost of the substitute was considered prohibitive until an investigation disclosed the fact that the commercial utilization of the sulphate had increased in recent years to such an extent that the price is now well within the economic margin, as compared with salt. Comparative tests extending over 3 months indicated the superiority of the sulphate. It was found that the use of salt had resulted in a deposition of copper chloride on the surface of the plates and the corrosion of the leads, whereas the plates and leads in the well in which copper sulphate had been used were only slightly pitted.

The system adopted by the company has been standardized, as follows: The ground well may reach a depth of 25 ft. and contains three 30x30-in. plates of $\frac{3}{16}$-in. copper, arranged at different depths. Two copper leads are bolted to each plate, the well being filled with 2,400 lb. of coke and 210 lb. of copper sulphate. Lightning arresters are provided with additional iron-pipe grounds, also surrounded with copper sulphate; these become coated with copper as electrolysis occurs, thus protecting the pipe from corrosion. The only precaution needed is that the sulphate be not used in the vicinity of a domestic water supply.

Large quantities of copper sulphate are also being used for the purpose of killing algæ in city water supplies; a process that has demonstrated the feasibility of making an asphalt concrete that will withstand high-temperature atmospheric conditions without "running" necessitates the addition of copper sulphate in amount equivalent to about 3 per cent of the weight of the asphalt used; the selective flotation of zinc mineral in some instances is facilitated by the addition of copper sulphate to the pulp, and considerable quantities are being consumed for this purpose.

These examples indicate a few unexpected applications of a single chemical compound in general industrial work. They suggest the greatly broadened fields of usefulness that await many other chemical products.

A Ceramic Institute

RECENTLY representatives of trade associations in the ceramic industries met to consider the possibility of establishing a centralized ceramic institute organized primarily to correlate and encourage fundamental research.

These trade associations represent most diversified phases of the ceramic industry—common brick, face brick, hollow tile, drain tile, sewer pipe, terra cotta, decorative tile, pottery, china, enamel ware, refractories, plate glass, cut glass, pressed and blown glassware, bottles, ornamental glass and glass containers. Several of these organizations have maintained research fellowships for the benefit of their respective members with most encouraging results and these have been among the first to recognize the value of fundamental research and to realize that such work to be successful would have to be supported by the industry as a whole. The proposed ceramic institute would probably not embrace a research organization for the purpose of actually conducting fundamental investigations, but would function rather as a central bureau through which research contacts could be made with government bureaus, university laboratories and other agencies. The whole plan is at present under consideration by a committee composed of three representatives of each trade association in the industry.

This committee will also have for consideration a suggestion that the institute and the American Ceramic Society function together. The idea is worthy of careful study, as the society is the only organization that represents all phases of the industry and through its industrial divisions it already has extensive research contacts. The society is thus functioning in a measure along the lines of the proposed institute.

That the plan should have reached even its present form indicates a healthy spirit of progress in the ceramic industry and the outcome will be watched with great interest.

Japan and Asia
Prof. Kotaro Honda
Tohoku University,
Sendai, Japan

British Empire
Dr. G. W. C. Kaye
National Physical Laboratory
Teddington, England

Holland
Dr. W. J. Van Heteren
Utrecht,
Holland

France, Spain and Portugal
Dr. Charles Marie
Paris,
France

The International Critical Tables

Notable Progress Being Made Under the Direction of the American Committee Aided by These Distinguished Foreign Scientists as Corresponding Editors

"How are the tables of constants progressing?"

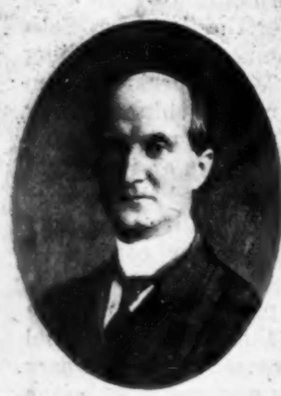
It is a frequent question of technical men in many industries. And, further, they wish to know what kind of constants are being compiled, whether on pure materials or industrial materials, and on what basis will the data be selected.

In answer to these questions it can be said that the work is progressing well. Under the auspices of the International Research Council the responsibility for this work has been assigned to the United States and devolves upon a board of trustees and a board of editors appointed through the National Research Council. The material is being collected and evaluated by more than 300 experts in every technically important country under the leadership of corresponding editors accompanying the article.

The program is comprehensive and covers all properties and numerical characteristics of pure substances, of physicochemical systems of definite composition, of industrial materials, of natural materials and such natural systems as the solar and stellar systems, the earth, biological organisms, etc. It is by far the most comprehensive set of data ever compiled and may well mark a new era.

Canada
Dr. Otto Maass
McGill University
Montreal, Canada

Italy
Prof. Nicola Parravano
Instituto Chimico
Rome, Italy



Denmark, Norway and Sweden
Prof. Niels Bjerrum
Copenhagen, Denmark

Switzerland
Prof. A. Berthoud
Neufchatel,
Switzerland

Control of Static and Stray Currents

Industrial Hazards From Electric Sparks Have Greatly Increased With the Wider Use of Flammable Solvents

By Carl Haner
U. S. Industrial Chemical Co., Baltimore, Md.

Prepared for use of the Manufacturing Chemists Association of the United States

It takes but a tiny spark and a flammable vapor to blow up a plant or cause a disastrous fire, yet few precautions are taken to render that tiny spark harmless. The difficulty of ascertaining the causes of an explosion or fire has tended to keep the little spark hidden. But with the increased use of flammable materials, static and stray currents are real dangers and preventive measures have become imperative. The name stray currents is self-explanatory. Their source is different from static, as are also the preventive measures. As a rule stray currents are of rather low voltage, but of appreciable amperage, while the reverse is true of static. In general, the method of preventing a static spark is by the proper grounding of all equipment. This method, however, will not work with stray currents; they can be rendered harmless only by turning off the source of the current.

Stray Currents From Street Railways

The most common example of the latter is where a railroad track crosses electric street railway tracks. Ordinarily the current should flow back to the street railway power station through the street railway track, but occasionally it short circuits over the steam railway tracks. When these tracks are spur tracks into a plant, it may happen that a tank car on a track carrying such currents is to be loaded or unloaded. This tank car will then carry current just like the rail and will then act like a live wire. A connection made to this car by a metal line, which can conduct off the current, will produce a spark when the two are brought together; the pipe line and everything else connected to it will then be charged and sparks may be produced at other points in the building. Whenever these sparks occur in an atmosphere of flammable vapor, there is a chance for an explosion or fire.

There are two possible remedies for such a condition.

Diagram Showing Where Stray Currents Were Found and Remedies Applied

The first one is to make a connection through a rubber hose or some non-conducting material. This, however, is not to be recommended, because this same hose, being a non-conductor, may produce static sparks. The only safe way is to install insulating joints on the railroad track, and enough of them so that the current cannot pass through the rails. Enough joints should be insulated so that a car cannot bridge the joint. Joints of this type are made by a number of companies, such as the Rail Joint Co., the Track Specialties Co., the Q & C Co., the Macallen Co., the Trumbull Electric Manufacturing Co. and the Johns-Pratt Co. They are used extensively in steam railway service in connection with electric signal systems. Wherever spur tracks entering a plant cross street car tracks, precaution should always be taken to find out whether there is any current flowing before a tank car is loaded with flammable material. The accompanying diagram shows a specific case where stray currents were found, and the preventive remedies are indicated.

Control of Static

Static is a natural phenomenon which cannot be prevented but which can be easily controlled. It is often called frictional electricity. It gets its name from the fact that even way back in ancient times it was noticed that certain materials when rubbed acquired the property of picking up light materials. Walking across a carpet and being able to produce a spark from your finger when touching a conductor like a gas pipe is a common example. The snapping and presence of sparks when stroking a cat's fur, combing your hair on a cold day, etc., are common knowledge. In a plant, static caused by a belt running over a pulley is perhaps the best-known example. It is not so well known, however, that flow of gas or a flow of liquid in a pipe line produces the same type of electricity. It is to be noted that static electricity is always formed whether it be a dry day or a wet day, but on a wet day it may be completely dissipated in the atmosphere without showing signs of an actual spark; in fact, we can go further and state that static is formed not only in these cases where the rubbing together of two different materials is obvious but also in cases where it is doubtful whether the materials are actually rubbed together or just merely quickly separated. For example, a belt running on a loose pulley will produce static, and in this case it is doubtful whether there is any real actual slippage of the belt.

In all cases the charge of one material is positive and the other negative. If the two materials are both conductors there is, of course, no accumulation of static; each positive charge on one conductor being immediately neutralized by the negative charge on the other.

In cases where the materials are non-conductors, the charges accumulate, as they have no chance of flowing back through non-conducting material and so neutralize each other.

In order to prevent the accumulation of static and thereby prevent the possibility of the formation of a spark, the remedy is to ground everything so that this static can be led harmlessly away. For a manufacturing plant this would mean to ground the building, to ground the equipment in the building, and where flammable materials are loaded into metal containers or tank cars to see that they are properly grounded and that there is no difference of potential between the loading line and the container or tank car to be filled. In most plants where flammable materials are handled a good many ordinary precautions are taken, such as using vapor-proof globes in the electric lighting, keeping all motors and generators outside of the buildings and outside of the range of the flammable vapors, or the use of totally inclosed motors cooled by air taken in from the outside and free from the possibility of having any flammable vapor in them.

In the loading or unloading of tank cars care should be taken to see that the loading or unloading line is grounded, and in addition that the car is connected by wire to the loading line in order to be absolutely sure that no difference of potential can exist between the car and the line. A simple and satisfactory method of doing this is shown in the attached sketch, which is the standard practice of the Standard Oil Co. of California. It consists of a No. 6 stranded flexible cable attached at the ends by heavy Universal battery charging clips to both the tank car and the grounded filling line. Such an arrangement will prevent the formation of any electrical sparks during loading or unloading. Additional protection against static can be obtained by keeping the filling line in contact with the dome of the car.

When Liquids Cause Static

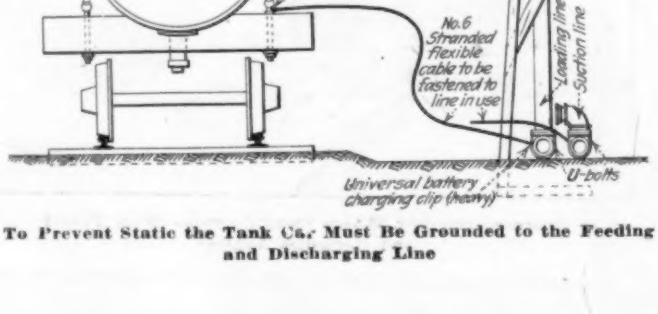
Liquid materials likely to cause static are those that are non-conductors or very poor conductors, such as gasoline, mineral oil, benzol, absolute alcohol, etc. In general, they are the type of materials that are dry and can carry no water. This is not true in all cases, but it is a good point to remember when it is not known whether the material is a conductor or not. In loading or unloading this type of material the practice of connecting the lines to the cars with rubber hose or other hose made of non-conducting material should be absolutely avoided. It is impossible to lead off static electricity by attempting to ground rubber hose at one or two points. For example, the accumulation of static on rubber hose when gasoline is flowing through it is so rapid that you can ground it at one point and within 2 or 3 inches of that ground pull a spark from it. It is for this reason that the filling hose used in gasoline stations is a spiral metal hose on the inside, covered with rubber or canvas on the outside. The spiral metal is attached to connections on both ends, one of which is fastened to the tank apparatus and is thereby grounded, and the other end to the filling faucet. In all states the fire departments demand that the precaution be taken that the filling faucet be in contact with the gasoline tank before gasoline is run through it and be kept in contact when filling. This is of great importance, because if the stream of gasoline was allowed to drop into a tank from a certain distance above the tank without this metallic contact, the car being insulated through its rubber tires, static sparks might form between the tank and the stream of gasoline.

Static in Action

There is a case on record which clearly shows the danger of using rubber with this type of liquid. A gasoline tank wagon was backed up close to an underground tank, a funnel was inserted in the fill of the tank and two pieces of inner tube were used to connect the faucet of the tank wagon to the funnel. When the gasoline was turned on the first thing that happened was that the inner tube began to flap back and forth, spilling a certain amount of the gasoline on the ground, and as the temperature was around 90 deg. F., this immediately vaporized and therefore readily produced an explosive mixture in and around the back of this tank truck. In order to avoid any more spillage the driver and a boy attempted to hold the rubber tube in the funnel. While doing so the boy noticed that the hair on his arm stood out straight, being attracted toward the rubber tube. The next moment there was a flash of flame and the gasoline on the ground and the gasoline running out of the tank wagon caught fire, doing considerable damage. This clearly shows that while the rubber tube was grounded at the point at which the man and boy were holding it, there was still enough accumulated static on the rest of the tube to discharge itself finally in some other way, probably through the elbow of either the boy or the man.

The plant superintendent will naturally be interested in the various ways in which static may be produced, and these can perhaps be best illustrated by typical examples. Some are given in an article by Charles L. Naylor and Harold E. Ramsey, in the February number of *National Safety News*, from which we quote as follows:

"One of the simplest examples of the formation of static known to the writers is a case of very heavy static discharges in tanks of filtered cylinder stock, 110-140 viscosity. This material is filled into steel tanks 20 ft. high by 15 ft. diameter, at a temperature of about 140 deg. F. by running from the open end of a 2-in. grounded iron pipe into a steel basket strainer, 18 in. high by 24 in. diameter, having a 100-mesh brass gauze in the bottom. The basket is supported on top of the tank by iron supports attached in the tank. The



To Prevent Static the Tank Car Must Be Grounded to the Feeding and Discharging Line

oil falls in streams 20 ft. or less. On dry days a charge of enormous voltage accumulates on the surface of this oil, discharging from time to time to the tank or to a vertical pipe in the center. The writers have seen discharges as long as 4 ft. in a jagged line across these tanks, accompanied by sharp reports.

"On account of the comparatively heavy grade of this oil, no trouble has resulted from these discharges. However, it was thought best to eliminate them. For this purpose a brass chain was suspended from the grounded frame of the strainer, so as to hang about centrally under it.

"The effect of this was to provide another point to which the arcs could discharge, somewhat reducing their length, but not materially decreasing the amount. Two types of baffles were then installed to deflect the oil stream against the side of the tank. Both failed to eliminate the sparking, because the oil again fell away from the tank and so again built up a potential. The desired result was accomplished by attaching a galvanized sheet-iron funnel under the strainer, bringing the oil into a galvanized spout, which conducts it to within a few inches of the bottom of the tank. This is below the normal oil level. With this arrangement most of the oil was kept in contact with grounded metal, and the rest in extremely close proximity to it. While some slight discharges might be expected within this spout, none has been observed, and sparking outside the spout has been entirely eliminated.

"The case of this tank calls to our attention the fact that a serious static charge can exist even with all metal parts and containers grounded, and that in pouring or loading flammable liquids in bulk, it is not necessarily enough to ground pipes, hose, tanks, etc. At least two fires are known to have occurred from pumping hot oils through grounded pipes into grounded tanks. Complete safety may require a conducting pipe practically to the bottom of the receiving tank or vessel. This must be determined for any particular case with respect to the material being handled."

Precautions for Alcohol

In equipment almost identical with the above but in which absolute alcohol was used and in which the stream was allowed to drop only 8 or 10 in., two slight explosions occurred. The filling line, the tank and the basket were grounded. The trouble was remedied by running the filling line all the way down in the tank, almost to the bottom, so that after the first small amount of alcohol got into the tank the end of the line was buried in the liquid.

Another example given in the same paper is as follows:

"A source of electric charges, perhaps less familiar but just as sure, is the steam jet. An instance which was brought to the attention of the writers was the following: An empty gasoline truck which came in for magneto repairs and was allowed to stand during lunch hour was found heavily charged by the workmen on their return. No other truck in the vicinity was charged and this truck did not become charged in any other location. A run on the asphalt paving failed to reproduce the charge. A little investigation revealed a small leak at a fitting on a nearby steam pipe, the wind being in such a direction as to carry the vapor across the body of the truck. It should be noted that the white cloud of steam had died out almost entirely before reaching the truck. Several rearrangements of truck and trailer and other trucks verified the conclusion that the steam leak was the direct cause of the charge. In experimenting to reproduce these conditions it was found that steam at 75 lb. per sq.in. gage pressure escaping through a $\frac{1}{16}$-in. round hole charged a truck sufficiently to give a $\frac{3}{4}$-in. spark in 5 seconds.

"This case strengthens the argument for grounding tank trucks before beginning loading or unloading and before opening the manholes, as there may be an initial discharge at the instant of making the connection, with danger of igniting vapors present."

The use of steam hose for steaming out tanks, tank cars or trucks presents the same electric conditions as above, but with the added hazard of having a nearly closed vessel filled with an explosive mixture. Steam hose used for this purpose should be provided with a ground wire, connected to the nozzles at each end as in the case of gasoline hose. A tank being cleaned should be grounded.

Another interesting case of static occurred when a tank car was being loaded from a galvanized iron building. During the operation of loading a thunder storm came up, and soon afterward a spark from the filling line to the tank car was noted and the next minute the material was on fire. This galvanized iron building was not grounded and it acted as an accumulator for the static charges in the air, and when they became great enough they discharged at the point of least resistance, which in this case was between the filling line and the tank car, in a location where there was of necessity an explosive mixture present.

This is similar to the conditions found on large dirigible airships. In all probability a great many of the fatal accidents have been due to this cause. The conditions are perfect for the accumulation of static. There is no way to ground the airship and the static may be formed either through the friction of the air against the material of the airship, or it may merely act as an accumulator of the static already present in the atmosphere, which is especially true in the case of a storm. It was noted some time ago that when the "Shenandoah" broke loose from its moorings sparks from 12 to 18 in. long could be obtained from the airship. The reason the ship got back safely was probably due to the fact that it was filled with helium, which is not flammable, instead of hydrogen.

It should be remembered, too, that static is also formed by the friction of a gas, usually in cases where the gas is under pressure and is suddenly allowed to escape through a small opening at high velocity. The static formed will set fire to the gas stream if the gas is flammable. This can easily be tested out by taking a cylinder of carbon dioxide and allowing the gas to escape into a canvas bag, as is regularly done in laboratories, to produce so-called carbon dioxide snow. A spark of considerable length can be led off from the bag by putting the hand near it.

The practice of cleaning gloves or silk by rubbing them with a woolen rag soaked in gasoline or some other material of that type should be absolutely prohibited. Here again the static electricity is very easily produced by the rubbing, and if it accumulates in sufficient amount to produce a spark an explosion is certain to occur due to the presence of the gasoline vapor and air mixture.

Many more interesting examples might be cited, but the above are typical and will serve as a guide to plant superintendents who are responsible for the handling of flammable materials.

Promoting Knowledge of Materials

Keynote of Service to Chemical Engineering Industries Struck With Renewed Vigor at Twenty-seventh Annual Meeting of American Society for Testing Materials

Editorial Staff Report

THE charter of the American Society for Testing Materials states that one of the functions of the society is "the promotion of knowledge of the materials of engineering." In the past this has been regarded in many quarters as more or less of a secondary function over which the formulation of standard specifications and methods of testing took precedence. At the twenty-seventh annual meeting of the society, held during the week of June 23 to 28 at Atlantic City, it was evident that increased thought and attention are being given to "the promotion of knowledge" of the fundamental properties of the materials in question.

Research requisite to the conduct of such work has been gaining headway and in the report of the executive committee for the year it is stated: "It is important that the society should consciously, in as systematic and concerted a way as possible, go about the task of extending the knowledge of engineering materials, their properties, their performance in service and the correlation of properties and performance that determine the suitability of various materials for specific services. The main emphasis in the society's work in the past twenty years has been upon standardization of specifications and methods of testing, and necessarily so. We have created the machinery and procedure for this purpose; and while the work should be continued as vigorously as ever, the emphasis for the immediate future at least should be on the promotion of knowledge of engineering materials."

George Martin Saybolt

To direct this work a special committee on the correlation of research has been appointed.

Symposium the Important Event

The symposium on corrosion-resistant, heat-resistant and electrical-resistance alloys undoubtedly marked the most important event of the week in this respect. So much of the material presented at the sessions of this symposium is of interest to the chemical engineering industries that a special report of it is to be published in the July 14 issue of *Chem. & Met.* Further activity of the same sort has been carried on with refractories, lime and other materials to a less extent. In addition the year has marked important advances in the work of the committees on rubber, petroleum, protective coatings and cement. A discussion of interest to most industries took place on proposed definitions for specific gravity and density of materials. Another paper of very general appeal was delivered by Thomas H. Wiggin on "How Shall the Benefits of A.S.T.M. Standardization Be Secured to the Small User?" Finally, not the least important event of the week was the testimonial dinner tendered George Martin Saybolt on Wednesday evening in appreciation of his services to the petroleum industry.

Saybolt Honored at Dinner

At this dinner, for which Colonel J. T. B. Bowles had charge of preparations, thirty-four close friends of Dr. Saybolt gathered to do him honor. K. G. Mackenzie, of the Texas Co., presided, and short addresses were made by W. H. Fulweiler and R. P. Anderson. To the inventor of the first practical method for the processing of natural gas to obtain gasoline, of the standard viscosimeters and colorimeters in use in the petroleum industry today, of numerous other methods and apparatus, to the man whose more than 40 years of service contributed largely to the present technical status of the industry, the signed testimonial that follows was given, by proxy, through Roger Chew.

"We have assembled around this board to do honor to you, the Nestor of petroleum technologists of the world, and desire to convey our greetings and to express our sincere admiration for what you have done toward a means of controlling the quality of those products, now so indispensable to mankind, and yet which were practically unknown to commerce until you began your long and active life.

"When a foundation has been laid, any workman can put one stone upon another. But the endurance of his work will depend upon the master who has laid the

foundation on which we, who are now gathered in your honor, are laying stones.

"To enter an infant industry without standards of quality and without means of arriving at quality, to provide that industry with such standards, to invent and supply instruments for the control of those standards, and to go with that industry as a leader until it has become a giant in American industrial life—these things have been the task of a man, and it is for these things that we now wish to do you homage.

"We present you with this testimonial, and attach our signatures, as a token of our esteem and our deep admiration for your services to the oil industry and to mankind, with the profound conviction that what you have wrought will endure."

Standardization for the Small User

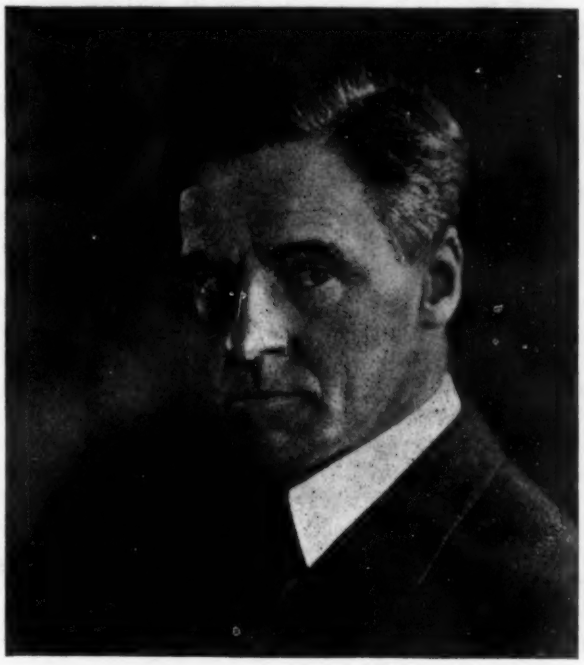
Although delivered in the course of a session on steel, the paper by Thomas H. Wiggin on the problem of the small user in obtaining the benefits of standardization of material purchased aroused much general discussion. He pointed out that a more constant recognition and emphasis by members of the society, both producers and consumers, that standards are for general use and not simply for use where there is inspection by the purchaser are highly desirable. Furthermore, he suggested the more general adoption of short designations for different grades of material, corresponding with society standards, and of the practice of stamping goods, after standard tests, with the name of the manufacturer and the grade, so that the small user can specify and have proof that he is getting material of the grade he desires and is willing to pay for.

A. H. Beyer and W. J. Krefield, of Columbia University, showed that considerable progress has been made with the materials used in civil engineering during the past 20 years and believed that proper publicity of the cost of failure through the use of improperly standardized materials will do much to help. They pointed out that Mr. Wiggin's suggestions "will not only result in a more economical use of engineering materials but will safeguard the small user against occasional failure resulting from the employment of materials of inferior or unsuitable quality which at present are likely to be found in any commercial lot."

Technical associations in various industries can do much to help the small user, in the opinion of F. N. Speller, of the United States Steel Co. If the A.S.T.M. specifications may be adopted as standard, with any special provisions necessary taken care of as footnotes rather than as major changes, the problem for the manufacturer becomes relatively much simpler.

Arthur D. Flinn, of the Engineering Foundation, New York, stated in a written discussion that he believed "A.S.T.M. might well devote an important part of its energy to the higher development of the science and technique of testing as a function of the production and use of materials and equipment. Such work might well establish methods which would be less objectionable to producers and less expensive, directly or indirectly, to users while advancing the interests of both."

That closer personal co-operation between the small user and the manufacturer is most important in this connection is the belief of C. F. W. Rys. Where a manufacturer puts out a single product the difficulty practically does not exist, according to G. G. Woodroffe, who further stated that if all manufacturers would use A.S.T.M. specifications, standard quality would obviously be insured.



F. M. Farmer
New President of the American Society for Testing Metals

Mr. Farmer is a graduate of Cornell, class of 1899, and has been identified with the General Electric Co., the Navy Department and the Electrical Testing Laboratories in New York City, of which he is now chief engineer. His experience in industrial research, testing and inspection of electrical engineering materials and apparatus has been broad. Subjects to which he has given special attention are electrical measurements, electrical insulating materials and electric power cables. He has been identified with A.S.T.M. activities for several years as chairman of the committee on electrical insulating materials and of the committee on rubber products. He was elected to the executive committee in 1921 and appointed vice-president in 1923 to fill an unexpired term. He succeeds Guilliaem Aertsen in the presidency of the society.

G. J. Fink applied the points brought out in the paper and in the discussion to the chemical engineering industries. He showed that failure of a given material to meet certain specifications usually only lowers process efficiency. No particular hazard is involved in the use of inferior material, and for that reason it is more difficult to arouse the interest necessary to formulate and adhere to fixed quality standards. Frequently the item of price may be the all-important factor in selection of a material to use, and where this is the case the advantage of using the higher quality material may be offset by the cost differential. Dr. Fink urged that in carrying this idea into the chemical field care be taken not to eliminate lower-grade materials for this reason. He showed that ignorance is the prime cause of the small user's getting unsatisfactory materials in the chemical engineering industries, stating that it very often costs no more to produce high-grade chemicals and intermediates than low-grade. He believed

that technical societies can help very largely in insuring the small user in a particular field by setting up a fixed requirement based on the needs of the industry in question.

Special Committee Proceedings

Because of the mechanism of its organization, certain developments take place in committee meetings of A.S.T.M. that are delayed in being reported in open meeting. The work of the refractories committee during the past year, for instance, has been highly important, but has not been carried to the point where conclusive facts could be reported. For the past 6 years a study has been carried on of actual service conditions in four industries: copper and lead, open-hearth steel, malleable iron and byproduct coke. Results obtained have been through active co-operation with the Refractories Manufacturers Association and on the basis of the classification by F. W. Donahoe, published last year. By this study of industrial conditions it is believed that data will be obtained upon which the much needed work of specification in this field may be conducted. J. A. Capp is chairman of a subcommittee on test of specifications, M. C. Booze on research, E. A. Watts on nomenclature and J. D. Ramsey on industrial survey.

Petroleum Committee Activity

N. E. Funk, of the Philadelphia Electric Co., and Max Hecht, of the Duquesne Light & Power Co., made reports respectively on sludging tests and determination of acidity in oils. Mr. Hecht pointed out that electrometric determination compares very favorably in every way with titration in determining oil acidity. In the report presented to the society by this committee many minor revisions of specifications were made, the only new one being on the burning quality of kerosene. E. A. Snyder, of the General Electric Co., gave an interesting paper on sludging of transformer oils that brings out certain facts regarding properties of these oils. Heat alone will not produce sludging either by polymerization or otherwise, nor will a combination of heat and such an inert gas as carbon dioxide or nitrogen. Heat and oxygen, on the other hand, form a sludge very readily, thus showing that the reaction is one of oxidation. The reaction will continue as long as any oil remains, although the rate of formation of sludge decreases as the reaction progresses. The desirable property in an oil, therefore, is long life before sludging begins.

Work of Rubber Committee

The work of the rubber committee for several years past has been toward the development of specifications for most mechanical rubber goods that are used in engineering. At present this work has been completed and for the coming year the efforts of this group are to be directed toward the development of an accelerated performance test for these products. It is felt that such a test is decidedly important and that through its application further improvement may be facilitated in the products of the rubber industry.

Lime for use in the chemical industries has in the past been specified on a fairly complete analysis. It has been found that the CaO content is the determining factor governing the use of the lime in most cases and for that reason specifications for the material used in cooking rags, in making silica brick, in the textile industry, in causticizing and in varnish have been simplified to make them hinge on this factor. An important line of work that is to be carried on in the future is a long-time research on the proper requirements for agricultural lime. It is felt that this is likely to prove very valuable both to producers and to consumers. Another activity barely mentioned in this year's report has to do with lime for structural purposes. Inasmuch as lime block are now being produced by the extrusion process (called the most significant development in the industry at present by certain leaders), further work may also be done along this line.

Of the papers read in the session on cement and concrete perhaps the one of most interest was that by Prof. Duff A. Abrams, of Lewis Institute, Chicago. He has found that the addition of calcium chloride to cement mixtures, preferably to the extent of about 2 per cent, gives increased strength to the resulting product, especially when the water content of the cement is reduced. Mortar is affected in much the same way. It was found in a long series of tests that the set was accelerated by the chloride addition, even to the point of becoming a flash set when used somewhat in excess of the percentages found to give greatest strength increases. In a discussion that followed the presentation of this paper it was fairly well agreed that the addition of calcium chloride did not accelerate the rusting of metal coming in contact with the cement.

The effect of dilute sulphate solutions upon concrete was discussed by Dalton G. Miller, who has found that in the curing of concrete, resistance to attack by sulphate-bearing waters is developed during the drying and hardening period in air and not during the period it is kept moist. He further reported that curing in steam in a temperature near boiling results in a product very much more resistant to attack than curing in water. Addition of blast-furnace slag, ironite and calcium chloride was found to increase the life of the product.

Weathering Properties of Varnish Materials

In connection with the development of an accelerated weathering test for varnishes, H. A. Nelson and F. C. Schmutz have developed several useful facts with regard to varnish composition. Deterioration is caused by limed rosin, especially where large amounts of water-resistant oil had not been used, and water, due to its emulsifying action, caused considerable permanent whitening. Because of the brittleness of this gum, considerable oil is essential, as otherwise the temperature-change effect may not be overcome. Congo gum, though considerably more water resistant than limed rosin, fails somewhat in the same manner. On the other hand, it is quite soft and permits a distensible film in spite of low oil content. Kauri gum appears quite hard, and is especially water resistant. For this reason it apparently improves the qualities of the film of a non-water-resistant oil, provided the latter is not present in too great excess. Of the oils tung is said to stand out as being especially qualified for improving the water-resisting qualities of the varnish and of increasing its resistance to the deadening action of the light. Linseed oil does not seem to be especially strong in either of these qualities.

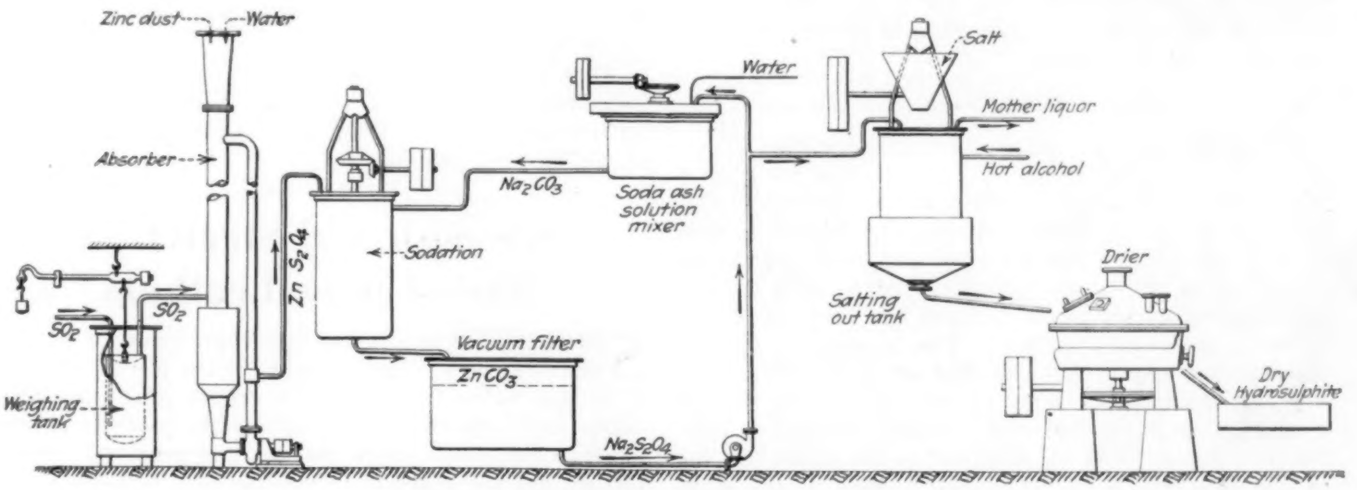
The papers and discussions mentioned in this report represent only a fraction of the total number presented at the meeting. They have been selected more to indicate the growing attention that is being paid to research not only as a necessary prerequisite to formulation of standards but for the further purpose of "promoting the knowledge of engineering materials."

Commercial Production of Sodium Hydrosulphite as a Dry Powder

The Story of a Successful Attack on a Problem That Presented Great Chemical and Technical Difficulties

By L. A. Pratt
Merrimac Chemical Co., Boston, Mass.

THE use of sodium hydrosulphite as a reducing agent in the application of dyestuffs has made this product of unusual importance. The manufacture of hydrosulphite in the form of a 10 to 12 per cent solution is easily effected by treating a solution of sodium bisulphite with powdered zinc or by passing sulphur dioxide gas (free from oxygen) into water containing powdered zinc in suspension. The zinc hydrosulphite thus formed is converted into the sodium salt by the addition of soda ash. Many concerns employing large amounts of hydrosulphite produce their requirements by one or the other of these two methods. The solution formed in this manner has the disadvantage of being unstable and must be prepared only in sufficient quantity for immediate use.



Diagrammatic Flow Sheet of Sodium Hydrosulphite Plant

The stable anhydrous sodium hydrosulphite powder has become a popular commodity because of its convenience and high strength. Its manufacture is accompanied by difficulties, however, and requires a considerable plant investment. The process of manufacture may be briefly described as follows:

Gassing Suspended Zinc Dust

Finely powdered zinc testing 93 per cent Zn or better is suspended in water in a lead container equipped with means for cooling and a stirrer or pump for agitation. Liquid sulphur dioxide contained in a weighing cylinder is gasified and passed into the lead container through a distributor located near the bottom of the apparatus. The gas can be passed rapidly at first, although it is best not to allow the temperature to rise above 30 deg. C. As the reaction proceeds, the rate at which the gas is passed must be progressively decreased. The amount of sulphur dioxide employed is weighed for the purpose of following a definite rate schedule, but the exact end point is determined by the color of the solution. The color changes from that of metallic zinc in the beginning to black, then to gray, and finally to cream. A yellow color must be avoided, as it indicates decomposition of zinc hydrosulphite into free hydrosulphurous acid, which is unstable. The time required for the "gassing" with sulphur dioxide depends upon the particular design of the apparatus employed, but in the plant being described is from 3 to 4 hours.

Sodium Hydrosulphite From the Zinc Salt

The zinc hydrosulphite solution is rapidly pumped to a lead-lined steel tank provided with a stirrer, and a previously prepared sodium carbonate solution is added in slight excess over the amount necessary to precipitate the zinc. The solution and the suspended zinc carbonate are dropped upon a suction filter located directly below the "sodation tank." If the precipitation has been carefully carried out, the filtration proceeds rapidly. The cake is washed with a small amount of water to replace the strong sodium hydrosulphite liquor and the combined filtrate, and wash water is pumped to a calibrated tank called the "salting-out tank." The zinc carbonate cake is subsequently washed

Presented before the Division of Dye Chemistry at the sixty-seventh meeting of the American Chemical Society, Washington, D. C., April 21 to 26, 1924.

more thoroughly and the wash water is employed in the next batch.

The Delicate Process of Salting Out

This operation is carried out in a jacketed steel tank equipped with a stirrer. The volume of the solution in the tank is noted and a sample taken for analysis. The solution should contain about 15 per cent sodium hydrosulphite by weight. A good grade of salt (NaCl) is added to the salting-out tank in an amount corresponding to 0.29–0.30 kg. for each liter of solution. The hydrated crystals of sodium hydrosulphite ($Na_2S_2O_4.2H_2O$) separate from the solution as the salt dissolves.

The mass is then heated rapidly to 60 deg. C. and the temperature maintained at this point until all the crystals have changed to the anhydrous form ($Na_2S_2O_4$). This point may be easily determined by examination of a sample withdrawn in a large test tube. The hydrated crystals are small needles which remain suspended for some time in the solution, while the anhydrous form consists of heavy, sandy crystals which settle out rapidly. When the change has been effected the temperature is lowered to 55 deg. C. and the stirrer is stopped to allow the crystals to settle. The transition of hydrated crystals to anhydrous crystals is 52 deg. C., and it is best not to drop the temperature quite to this point. The supernatant liquor is siphoned off, and hot denatured alcohol is added to the salting-out tank. The alcohol and hydrosulphite crystals are agitated for several minutes by means of the stirrer and then dropped through the bottom outlet into the drier.

Drying a Sensitive Material

A Buffalo cast-iron, vacuum crystallizing pan is employed for the drying operation. A high vacuum is important in order to avoid loss by decomposition. As soon as the crystals have settled, the hot alcohol wash is siphoned off and a second and third hot alcohol treatment is given the crystals. After each alcohol addition the stirrer is started and the contents of the drier are thoroughly agitated. The crystals are allowed to settle and the alcohol siphoned off as in the case of the first wash. The drier is then closed, the stirrer placed in motion, and the vacuum applied. Low-pressure steam (5 lb.) is admitted to the jacket and the drying proceeds until no alcohol is seen in the sight glass beyond the condenser. At this point the temperature in the drier is about 90 deg. C. and the material has become somewhat dusty. The steam is turned off and cooling water circulated until the product has been cooled to 40 deg. C. or lower. The vacuum is then released and the contents of the drier are discharged into shipping containers and sealed. The product is a light gray, sandy material testing 85 to 90 per cent $Na_2S_2O_4$.

Special precautions must be taken to avoid alcohol losses in the recovery and rectification.

The mother liquor from the salting-out process contains considerable sodium hydrosulphite and must be further treated, if the highest efficiency is to be obtained.

The writer acknowledges his great indebtedness to his colleagues in the research, engineering and manufacturing departments of the Merrimac Chemical Co., who played an important part in the development of the process.

Skimming Plants in Oil Refineries Studied

Tests on a semi-commercial scale in the study of skimming plants at oil refineries have been completed by M. P. Youker, refinery engineer, Department of the Interior, attached to the Bartlesville, Okla., experiment station of the Bureau of Mines. Skimming consists of the removal by distillation of the lighter products, essentially gasoline and kerosene, from the crude oil. Field tests were made at various refineries in order to determine the efficiencies of different types of distillation apparatus in common use, and this work was supplemented by laboratory tests which determine the effect of pressure changes, presence of steam and rate of vaporization on distillation. As a result of these tests, an improved type of apparatus was devised for distilling off the gasoline and kerosene. This apparatus, known as a fractionating column, has, it is believed, a greater efficiency than any column unit now in use. The information obtained will be applied on a commercial scale, and arrangements are being effected for full-size installations in commercial plants.

Electric Furnace Production Grows

The production of steel by electric furnaces is increasing at a remarkable rate, and new high records were established in several branches of the industry last year.

Steel castings from electric furnaces in 1923 totaled 235,958 tons, an increase of more than 50 per cent over the previous record, made in 1920, while 10 years ago electric steel casting amounted to less than 1 per cent of the country's output.

Alloy steel casting from electric furnaces also broke all records in 1923, with a total of 29,054 tons. This is an increase of 64 per cent over the previous high mark of 17,760 tons, made in 1922.

Strength and Stretch of Shoe Upper Leathers

STRENGTH is one of the important qualities in shoe leathers. If the leather used for the uppers of shoes is brittle rather than tough, it cracks where the shoe bends just back of the toe cap and the pieces will tear apart at the seams where the strain is greatest. Tough leather will also stand more resoling than brittle leather. For comfort, shoe leather should be flexible and should stretch to some extent but not too much, as excessive stretch shortens the life of the shoe and destroys its trim appearance.

Tests that bring out the variations among leathers in this respect have been made at the Massachusetts Institute of Technology. Upper leathers made from cow hide, calf, kid, cabretta, India goat, India sheep, glazed sheep, glazed horse, kangaroo and buckskin were tested. The India goat and sheep were partly tanned in India and retanned in the United States. Twelve strips, each 6 in. long by 1½ in. wide, were cut from each kind of leather, the longer dimension being cut parallel to the backbone. All strips were brought to a uniform temperature and condition as regards moisture absorption and were measured for thickness by means of a micrometer reading to one ten-thousandth of an inch.

Each strip was clamped between the upper and lower jaws of the machine shown in Fig. 1. The jaws were slowly drawn apart by the machine, stretching the

leather until the breaking point was reached. The finger on the dial at the top indicated the number of pounds tension applied to the strip at the moment of rupture.

The figures for each set of twelve strips were then averaged. Taking the strength of kid as 100, the relative strength of the other leathers, thickness for thickness, was as follows:

Kangaroo	117	Glazed sheep	85
Kid	100	Cabretta	75
Glazed horse	98	Cowhide	72
India goat	87	India sheep	69
Calf	86	Buckskin	32

Attached to the machine which measures the tensile strength of the leathers is a device for automatically recording the stretch of the material under load. As the jaws separate a sliding pen marks on diagram paper the stretch in inches for every pound tension applied.

The results for the leathers under investigation are shown in Fig. 2. It will be noted that at 100 lb. the stretch in 3 in. of cabretta was just $1\frac{1}{2}$ in., or 50 per cent. At 160 lb., cow hide and glazed horse showed little elasticity, stretching only 25 per cent. At the other extreme was cabretta, which stretched 66 per cent, and buckskin as much as 100 per cent. The results show the remaining leathers almost as one group between 40 and 45 per cent and confirm the opinion that side leathers are too rigid to be very comfortable; that cabretta stretches so much that it quickly loses its shape and even though kid is much more comfortable, it does not stretch any more than calf and the other leathers in the medium group. The results at 160 lb., expressed as percentages, are as follows:

Buckskin	100	India sheep	42
Cabretta	66	India goat	40
Kangaroo	45	Glazed sheep	32
Kid	42	Glazed horse	25
Calf	42	Cowhide	24

Other investigations on this subject have been made at the laboratories of the A. F. Gallun & Sons Co., Milwaukee, and the following comments on the above tests by John Arthur Wilson, director of these laboratories, have a most important bearing on the whole problem.

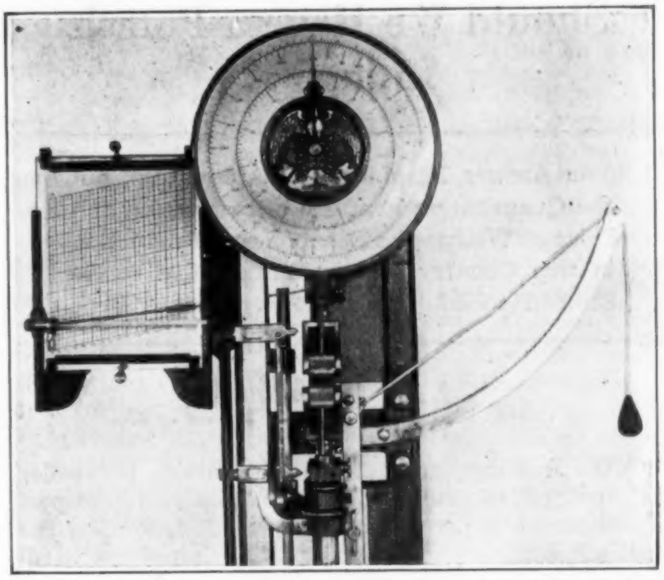


Fig. 1—Machine for Measuring Strength and Stretch of Leather

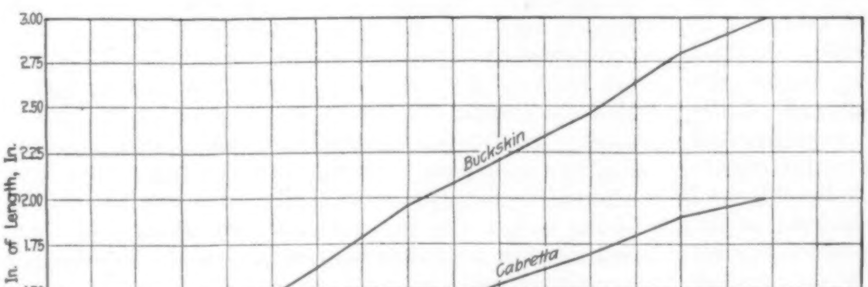


Fig. 2—Stretch Tests on Various Leathers

Comments on Strength and Stretch Tests

By John Arthur Wilson

Chief Chemist, A. F. Gallun & Sons Co., Milwaukee

The results given above proved especially interesting, because we have done a considerable amount of work on the same subject. My chief criticism is that the data presented are too few to warrant the conclusions drawn, which actually appear incorrect, in many respects, in the light of results obtained in this laboratory under rigidly defined conditions.

For example, we find untrue the conclusion that kid leather does not stretch any more readily than calf and is stronger. For samples strictly comparable—that is, taken from corresponding points on the skins, neither having been split and both having the same oil content and kind of tannage—the kid leather was found to have a tensile strength only 67 per cent as great as calf and a stretch 71 per cent greater. In tensile strength the calf measured 1,140 lb. per sq.cm. cross-section against 780 lb. for the kid. At 160 lb. pull, the calf stretched 28 per cent and the kid 48 per cent. The strips were cut 1 in. wide and the distance between the jaws of the Scott machine was 6 in. The thickness of the calf skin was 0.71 and the kid 0.93 mm. Increasing oil content has little effect upon the strength of kid leathers, probably because of their very loose structure, but the tensile strength of calf leathers increases directly with oil content, showing no point of maximum.

Probably the results were seriously influenced by the extent to which the original thickness of the skins was reduced by splitting. The importance of this factor will be appreciated from the following actual measurement. When the thickness of a heavy calf skin was reduced by splitting from 1.80 to 1.04 mm., its tensile strength, in lb. per sq.cm., dropped from 512 to 120. Details of the measurements being made in this laboratory will be published at a later date.

Should We Have a Potash Industry?

The Answer Is, of Course, Affirmative, but the Quantitative Features of Production and Price as Well as the Economics of Production in this Country and in Europe Had to Be Studied to Make That Answer Intelligent

J. W. Turrentine
In Charge Potash Investigation, Bureau of Soils

Potash is a commodity over which there was considerable excitement during the war. This was natural. An essential ingredient of fertilizer could not be obtained! All of it was produced in a country blockaded by war. The subsequent development of an industry with a potential production of 100,000 tons of K_2O per year and its almost complete deflation make a live story of industrial adventure. With the story Mr. Turrentine has had intimate contact and his comments on the future of the potash industry are built upon quantitative knowledge.

THE ambition and the determination to render America independent of foreign countries in respect to its potash supplies resulted immediately upon the realization of that dependence. It required the hard-fisted methods of the former German monarchy as applied to American importers of German potash to bring home to us the absoluteness of our dependence on Germany for all of our potash. There being no other foreign source to which to turn, the natural reaction was that we should take stock of our own raw materials to see if therefrom it was not possible to develop a domestic potash industry. This resolve found point in 1910, when the government's surveys of American raw materials for potash manufacture were begun.

The value of these surveys to America cannot be measured in ordinary units. They have a value greatly in excess of the millions of dollars worth of potash subsequently produced and directly attributable thereto. It was the threat of the late German Empire that because of the potash monopoly which it held the world could be subjected to potash starvation at its will and be forced to yield to its dictation, a challenge that was met in America by the prompt development of practically all of the sources of potash already surveyed by governmental agencies and the establishment of potash manufactories which made America for the time being independent of all foreign potash. The effect on the outcome of the world-wide imbroglio of this show of spirited aggressiveness on the part of America cannot be determined, as its value is inestimable.

Under the impetus of that period a relatively enormous amount of work was done both by governmental and private agencies on the technology of extracting potash from the American raw materials. Some of this work through private agencies would have been ill advised had it not been for the fictitious prices obtaining at that time. Properties were developed without regard to anything but the profits of the moment.

The results judged as a whole were exceedingly good. Within a period of 4 years facts were established which under ordinary circumstances would have required many more years of research to establish. The cost was great, but perhaps not out of proportion to the results obtained.

The consumption of potash in American agriculture closely coincides with importations, since the bulk of the potash imported is used in the fertilizer industry. All of the low-grade salts enter fertilizers.

The importations of European potash for a 10-year period are shown in Table I. The period 1913-22 is chosen to show the decline in imports due to the war-time embargo placed at the source on German potash and the recovery realized when that embargo was lifted, and likewise because it was the period during which the American potash industry had its rise and decline. With the termination of the war the return to France of Alsace with her rich and important potash mines apparently broke the German monopoly. France immediately transferred these mines to French management and entered the world market with Alsatian potash. Inasmuch as the American importers contracted for their potash requirements in the proportion of 75 per cent from the Germans and 25 per cent from the French, it may be assumed that the post-war importation from the respective producing countries was resumed on the basis of that ratio.

Activities in connection with American potash may be divided into three periods. It will be recalled that during the period beginning in 1910 and ending with the inauguration of the European war in 1914 the government's potash work had to do principally with reconnoissance surveys of the United States for possible sources of potash. The succeeding period, represented by the 4 years of the European war, was devoted to the development by private interests of practically all the sources of potash discovered and surveyed by the government. The results of this period are indicated by Table II, showing war-time domestic potash production. The third period, represented by the time that has elapsed since the termination of the war, has been one during which the complete deflation, so to speak, of the potash industry has taken place, during which all of the potash industries established during the preceding period have been subjected to the most trying economic test to see whether or not the raw materials on which they were based and the processes they employed are feasible for peace-time conditions.

During this period the American sources of potash

Table I—Total Potash Salts Imported Into the United States for the 10-Year Period, 1913-22, Inclusive

Year	K_2O Short Tons	Value
1913	255,101	$13,200,413
1914	193,878	10,700,308
1915	42,519	3,257,114
1916	1,726	453,091
1917	504	189,159
1918	261	117,438
1919	28,484	4,163,739
1920	197,795	33,885,627
1921	64,036	7,743,364
1922	186,164	10,951,197

which were placed under development were, principally, Nebraska Lakes brine, Searles Lake brine, Salduro Marsh brine, Salt Lake brine, kelp, cement dust, blast-furnace dust, Steffens waste, distillery waste, alunite, leucite, greensand, Georgia shales and wood ashes.

Table II gives the potash produced from these various sources during the war years, together with the price obtained.

Table II—Domestic Production of Potash in the United States, 1915-22, Inclusive

Year	Crude Potash, Short Tons	Available Content of Potash (K_2O) Short Tons	Value
1915	4,374	1,090	$342,000
1916	35,739	9,720	4,242,730
1917	126,961	32,573	13,908,577
1918	207,686	54,803	*15,839,618
1919	116,634	32,474	*11,271,269
1920	166,834	48,077	*7,463,026
1921	25,485	10,171	*447,859
1922	25,176	11,714	*463,512

* Value of amount sold.

It will be observed that domestic production reached a maximum of about 55,000 tons K_2O in 1918, and in this connection it should be stated that at that time additional and enlarged plants were about to be put into commission which would have doubled this amount. So that it may be said with fair accuracy that we had developed a producing capacity of approximately 100,000 tons of K_2O.

With the reappearance of German potash on the American market American potash industries for the most part suspended operations. However, it should be noticed that certain industries have been able to withstand this period of exceedingly severe economic competition and are now producing potash of an excellent grade and of a tonnage which though small is highly significant. This potash is produced as a byproduct of industries already well established and well recognized—to wit, the cement, the borax and the distilling industries. While the potash produced by them at present is perhaps not more than 20,000 tons (basis K_2O) it should be emphasized that by a process of natural growth they should be able to develop an output of approximately 100,000 tons per annum.

Of the above list of raw materials utilized during war times it should be noted that the potash yielded from Searles Lake brine, cement dust, blast-furnace dust and Steffens and distillery waste is a byproduct and if all the potash now for the most part being thrown away were conserved the annual output would be in the neighborhood of 200,000 tons.

American demands should be placed in the neighborhood of 300,000 tons of potash per annum. This leaves a liberal margin for expansion of the fertilizer industry for several years to come. We are allowing to go to waste in our industries an amount of potash equivalent to two-thirds of our requirements and it is entirely logical to believe that it will be possible by normal process of growth to realize this production.

Although the bulk of the potash imported into this country enters fertilizers, it has wide application to a less important degree in other manufactories, as it is essential to the production of certain explosives and other war munitions, and special grades of glass, soap and safety matches.

A continuation of this discussion dealing particularly with the European situation and with future developments in America will be published in a later issue.

Progress in Solid Fuel Technology

By R. T. Haslan and E. W. Thiele

THE use of powdered coal, which has increased tremendously recently, is perhaps the most important single development of recent years. Use of flue-gas driers, unit pulverizers from which the coal is blown directly into the furnace, and the tendency away from excessively fine grinding, have all aided in this progress. The danger of discharge of large quantities of ash through the stack is one point of criticism and controversy. Very high efficiencies up to 90 per cent are obtainable with powdered coal, and this alone insures further progress.

Knowledge of the constitution of coal perhaps is the second most important subject considered, and the relation of coal constitution to spontaneous combustion adds immediate practical importance to the subject. The work on coal constitution by various methods has led to quite different conclusions, and no generally accepted theories seem yet available.

Use of Low-Grade Fuels Growing

Lignite utilization has been developed principally by the Bureau of Mines through the Hood-Odell oven. Germany has, however, gone farther in this work because of the much greater importance of lignite application in that country. Apparently no radically new methods for peat utilization have developed recently.

Magnetic separation of unburned fuel from ash, carbonization of high ash coals, especially for motor fuel production, use of low-grade coal under boilers and the household use of small steam sizes of anthracite are all receiving attention. One such example of low-grade fuel use is through small pressure blowers, of which about 2,000 have been installed in Harrisburg to burn steam sizes of anthracite.

A study of fundamentals in blast-furnace fuels has come about through investigation of the combustibility of metallurgical coke. However, neither a theoretical nor sound empirical connection has yet been found between the results of laboratory tests and the actual performance of coke in the blast furnace. Several theories and proposals of limited acceptance have been made, but no generally accepted conclusion is yet available.

Low Temperature Carbonization

The interest in carbonization of coal at low temperature is very great and widespread. But the real problem seems to be a determination of the market for the products. Until more is known about the usefulness and market value of low-temperature coke and low-temperature tar, no plant, however technically successful, can be a large commercial success. Laboratory and industrial study of these products therefore is urged.

The three principal low-temperature processes of interest in the United States are the Carbocoal process, the Greene-Laucks process and the Piron-Caracristi process. In England the Coalite process continues to report progress and MacLaurin retorts are in commercial use. In Germany, Schütz is applying a horizontal revolving, externally heated retort with a capacity of about 50 tons a day. An interesting supplement to this is the Fisher process for extracting of phenols with superheated water.

Presented more completely at Washington meeting of A.C.S.

Boosting Flame Temperatures With the Electric Arc

An Account of a Newly Developed Method of Increasing the Heat Available From Fuel Combustion by Electricity

By George T. Southgate
Consulting Engineer, Birmingham, Ala.

THE "Pyrelectric" process is a method of co-operation of electric arcs with and in blast flames of gas, sprayed liquid or powdered solid fuel. One terminal of each arc is an electrode normally incorporated within a fuel nozzle; and the combined electrode-nozzle is called a "pyrelectrode." The main purpose of "Pyrelectric" heating is the joint use of combustion energy and electricity in various usual types of furnaces in such manner that fuel, the cheaper agent, supplies the greater part—80 to 90 per cent—of the total heat, and electric-arc energy supplies the remaining smaller portion for raising the temperature above that attainable by combustion alone.

The process has now been fully developed in principle and applied in typical operations of melting and smelting. A description of the furnace employed is given herewith, with examples of its work.

While the prime feature of this method is the superimposing upon fuel combustion of a moderate amount of electric-arc energy for the purpose of superheating, there are a number of other objects of the process. Among these is the use of line voltages and moderate currents instead of the low voltages and great currents that require special transformers in ordinary electric-furnace operation. A very important utility is the attainment of temperatures that, while above those of combustion, are considerably below that of the electric arc; so that the effectiveness of a sufficiently high temperature may be realized without the excessive intensity that characterizes the electric furnace. A further service of this flame is the placing of its intense heat in working zones where electric heating is otherwise impracticable because of oxidizing atmospheres and consequent destruction of electrodes. On the other hand, when the combustion is of reducing nature, the deoxidizing action is very powerful, because of the high temperature.

Character of Pyrelectric Flame

For satisfactory operation, it is necessary only: (1) that the combustion flames shall have free spaces of play such as are usual in fuel furnaces, in order that each electric arc may have a few inches of span, and (2) that each combustion flame shall possess sufficient velocity to give a mild blast action, for confining the arc against wandering. The pyrelectric conduction is that of an arc running in a narrow stream within each combustion flame. Through heavy amber glass the appearance is as of a vivid, fairly straight stream of liquid fire (the arc) in a faintly luminous surrounding glow of combustion flame.

A natural question arises as to why it is worth while to employ electric superheating instead of a greater quantity of fuel. The answer is that electric-arc heating occurs at temperatures far above those possible to attain with air combustion of any quantity of our hottest standard fuels. The temperature of the carbon arc is above 3,600 deg. C., while the highest temperature practically attainable by coke or oil combustion with air is about 1,800 deg. C. Even this intensity is more than 100 deg. higher than usually realizable on a commercial scale, 1,700 deg. C. being a high temperature for actual working combustion with preheated air from expensive systems of checkerwork. Where the electric arc is superimposed upon a combustion flame, the effective temperature of the joint flame can be made of any value desired, throughout a long practical range, according to the proportions of fuel and electric heat. That the effect of the arc is one of pure superheating rather than of mere bulk heat addition is obvious from the very high temperature at which the arc heat is superimposed and from the fact that the arc gases are cooled down to the resultant joint-flame temperature rather than heated up thereto, as would be the case of merely adding more fuel for combustion. Of course the effective temperature here indicated is that in the furnace-working region of the intensified combustion—that is, the focus—and not in the spent gases beyond zones of fusion or other useful work.

Calculation by entropy shows that by the addition of 20 heat units in the form of electric-arc energy at 3,900 deg. C. absolute (3,627 deg. C.) to every 80 units of combustion heat at, say, 1,950 deg. C. absolute (1,677 deg. C.), we may raise the temperature of the resultant joint flame to 2,166 deg. C. absolute, or 1,893 deg. C. This is an increase of more than 200 deg., and brings the intensity of the hottest ordinary fuel heating to a higher temperature, which, for a majority of purposes, is one of great facility, efficiency and rapidity of action.

In the above calculation there is not taken into account another pronounced effect observed in actual operation. This phenomenon is the great acceleration of oxidation caused by the ignition effect of the electric arcs, and the corresponding intensification of the exothermic action or combustion. With voluminous combustion in starting furnace heating, the flame length is observed to be shortened to less than half when the switch is closed and the arcs start their powerful action, while the brilliancy of the combustion beyond the arcs is observed to be greatly increased. This effect must give some hundreds of degrees of additional intensifying. Direct optical pyrometry of flames is, of course, impracticable; but very refractory substances have been readily melted in a pyrelectric furnace, as noted below.

The efficiency of transfer of the electric superheat to the work is also much augmented by the dazzling

radiation of the arcs, the result being to increase the effective focal intensity.

Heat Costs

If we take for one typical case the use of powdered coal, from bituminous slack costing $4 per short ton delivered and $1.50 per ton for moderate-scale drying and powdering, total $5.50 in the powdered state, and if this coal contain about 12,000 B.t.u. per pound, which with the conversion ratio of 3,412 B.t.u. per kw.-hr. gives a total of about 7,000 kw.-hr. per ton, we should have as the cost of powdered coal in electric units, $0.0008 per kw.-hr. For an equally typical price of electricity itself, we may take $0.008 per kw.-hr. The ratio of cost of electric heat to that of fuel heat is for this case 10 to 1. If we employ 80 units of fuel heat with every 20 units of electric-arc heat, we shall obtain our efficient furnacing at temperatures over 200 deg. C. (360 deg. F.) higher than those of the best combustion, for a price of $0.00224, or 2¼ mills per kw.-hr. of total heat.

Fig. 1—Section of a Pyrelectrode, for Oil Fuel
For gaseous or powdered fuel there is no stricture at the orifice *O*.

Reference Letters in Drawings and Photographs

A Arcs (40 amperes, 2,200 volts, three-phase, in Anniston furnace).
B Box, for housing high-voltage parts and for distributing secondary air.
C Coupling.
D Duct for air supply to the wind-box.
E Electrode (1¼-in. diameter in Anniston unit).
F Fuel flame (of crude oil, in Anniston furnace).
H Hole for tapping bath.
I Induction tube for fuel and primary air, of electrically insulating material (rubber hose in Anniston furnace).
J Joint in electrode, standard nipple type.
K Conduit for electric cables.
L Line terminal.
M Melt or bath of furnace.
N Nozzle of pyrelectrode.
O Orifice of pyrelectrode.
P Pyrelectrode.
R Lower portion of shaft (serving as charging passage in Anniston furnace).
S Secondary-air ports.
T Tube for feeding rod electrode as consumed ("slip tube").
U Unignited fuel-and-air mixture.
V View window, of deep amber mica.
X Extension nipple of slip tube.
Z Electrically insulating support for pyrelectrodes, preferably internally channeled with passages for secondary air.

Apparatus

Fig. 1 shows a typical practical construction of a single pyrelectrode, and Fig. 2 shows the generally preferred arrangement of three-phase sets. Each unit is a simple assembly of pipework, with an inner slip-tube for the rod electrode, an outer nozzle for delivering the fuel-and-air mixture along and past the end of the projecting electrode, and an insulated supply connection to the nozzle. Each pyrelectrode is conveniently insulated by mounting in a bushing of refractory material. The most intense heating occurs at and beyond the electrode tip, well removed from the nozzle, the latter being in shadow therefrom. In the use of liquid fuel the pyrelectrode is so well cooled by the fluid that ordinary steel pipe and iron fittings are employed. For powdered coal or hot gaseous fuel the working tubes must be of refractory. In all cases the secondary air, or combustion-supporting air in excess of that projected with the fuel, is inducted around the pyrelectrodes, the units being thus greatly cooled.

Applications

Some of the furnaces in which pyrelectric heating may be advantageously employed are illustrated in Figs. 3, 4, 5 and 6. These types may be roughly classified according to function, as:

(*a*) Units in which calcining of bulk material is effected without fusion, but not excluding sintering. The function of pyrelectric heating is here to give more rapid action and hence greater capacity for a given size of unit or, in other cases, to sinter materials of high fritting temperatures, such as portland cement low in iron. Obviously the best type for this purpose is the rotary kiln.

(*b*) Units in which raw materials are melted with or without chemical change and in which solid fuels or reducing agents are not employed. For this utilization of pyrelectric heating apparently the best type of furnace is a rotary cylinder on a horizontal axis. If the treated material gives off large quantities of combustible gas such as CO, this furnace may be reduced at one end to a smaller diameter; the smaller portion being elongated as an inclined rotary tube in which the combustible gases are burned and their heat value recovered by preheating of the stock on the counterflow principle. If the operation yields no combustible gas, the rotary furnace need be only of length comparable with its diameter. Examples of this latter use are the melting of brass, bronze or gray iron, and the melting and refining of steel.

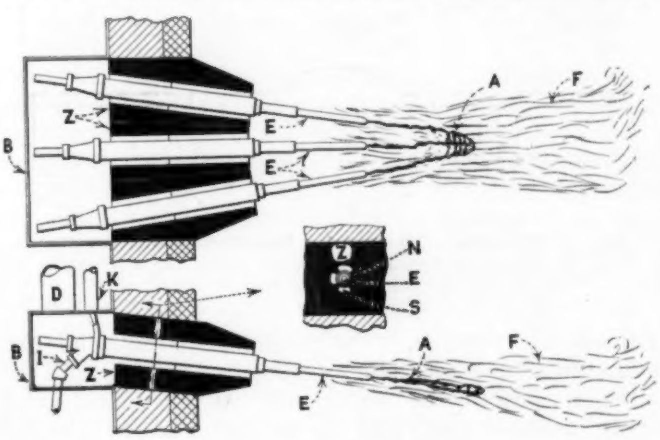


Fig. 2—Mounting of a Three-Phase Set of Pyrelectrodes

(*c*) Units in which refractory bodies are fired at very high temperatures without tumbling or other disintegrating treatment, as in the case of ceramics. For this purpose pyrelectric heating seems to offer its best assistance to the tunnel kiln, since this is a counterflow furnace and since with pyrelectric heating no change is involved in the kiln operation other than the handling of extra-hot flames and gases.

(*d*) Furnaces in which raw materials are smelted with the use of solid reducing agent, or melted partly by solid fuel. Apparently the best form of construction

for this operation is that of a vertical shaft terminating at its lower end in a hearth of sufficient internal volume to provide space for at least partial combustion of the fuel of the pyrelectric heating. Such a furnace is fed with coke; the stock being preheated in its descent through the shaft, partly melted there and, in the case of ore, partly or wholly reduced to metal or slag. The stock is then completely melted and rendered very fluid in the superheated hearth, from which it is tapped. In large units the hearth would be proportionately smaller than illustrated, in fact, little larger than the usual hearth of the iron blast furnace.

ANNISTON FURNACE

At Anniston, Ala., the writer has built and operated an abbreviated unit of the type last mentioned—abbreviated in that the shaft is only a stump. It is shown in the two photographs, Figs. 7 and 8. This furnace, while not as efficient as a complete shaft-and-hearth combination, has sufficed to exhibit the performance of the pyrelectrodes proper and gives a partial conservation of the heat of the gases, since they must pass through the stock for a short distance before they can escape. The demonstration equipment was built into

Fig.3

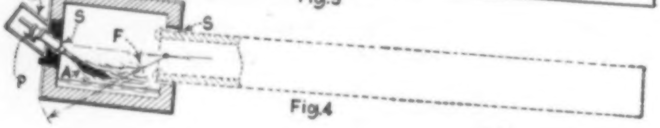


Fig.4

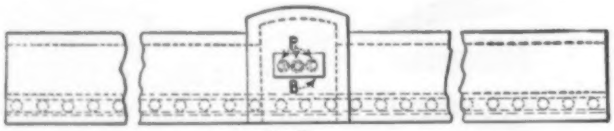


Fig.5

Fig. 3—Mounting of Burner for Rotary Calcining Furnace
Fig. 4—Mounting Using Combustible Gases for Preheating
Fig. 5—Mounting for Tunnel Kiln

an existing furnace. The assembly contains all the elements of a pyrelectric smelting or melting unit of any size. In it the writer has rapidly melted steel scrap (without coke) and has smelted iron ore mingled with limestone and coke. In the latter case the hematite was quickly melted and converted to ferrous oxide, and appreciable metallic reduction was effected. The reduced metal, instead of being gray cast iron, had the white lustrous appearance and the malleability of steel. Following the steel melting and the ore smelting, there have now been melted in other runs refractory basic slag and cast iron respectively, each in about 1-ton lots; and full charges of phosphate rock, a more refractory substance, have been fused. The steel and iron charges started running freely from the taphole within 15 minutes after cold charging; and iron ore and basic slag within 45 minutes to 1 hour. Numerous runs have been made before visiting engineers interested in potential applications.

The operation of the Anniston unit has been at 750 to 1,000 kw., averaging 850 kw., of total heat input in fuel and electricity. As the electric input has been 150 kw. in all runs, its proportion of the total has ranged from 20 to 15 per cent. The fuel is crude oil, and its atomization is effected merely by projection, with primary air, through the strictured orifice shown as *O* in Fig. 1.

GENERAL

A fuel-electric furnace in which the heats from the two sources are liberated in the same flames and in a chamber permissibly of oxidizing, neutral or reducing atmosphere has none of the limitations of an attempted union between a fuel unit and an ordinary large-electrode furnace. In the pyrelectric furnace the electric superheating is united with the fuel combustion in one furnace focus; whereas in the other, the combustion must be well separated from the electrodes for non-oxidation thereof. In the shaft furnace, the single-focal concentration of pyrelectric heating is of decided advantage: (1) in preventing climbing of the zone of fusion, and (2) in increasing the efficiency of transfer of heat into endothermically reacting bodies in process

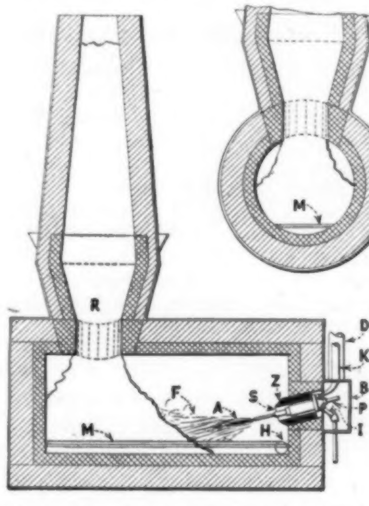


Fig. 6—Mounting of Burner for Smelting Furnace

of reduction, from nearby exothermic oxidation of combustible reduction products.

The relatively small electrodes employed in the high-voltage, low-current pyrelectrodes are immersed partly in unignited fuel and partly in reducing flame, and are but slowly consumed, by only the arc wear. Since voltages from 600 to 6,600 are applicable and as the bulk of the energy is furnished by fuel, it is evident that electrode rods of only a few inches diameter are required, and that their consumption is slow.

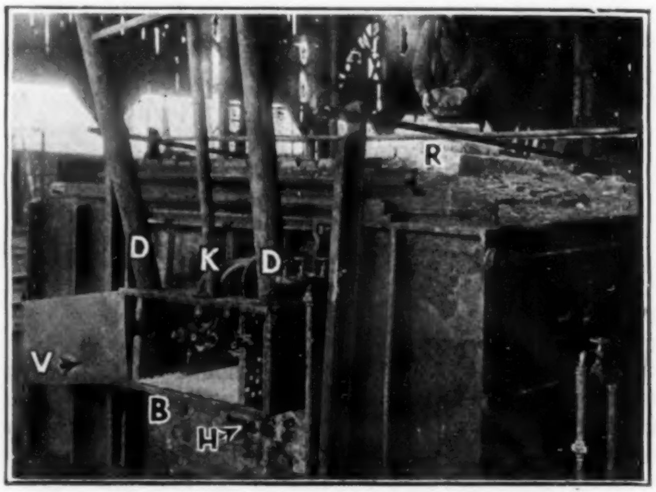


Fig. 7—Experimental Furnace at Anniston

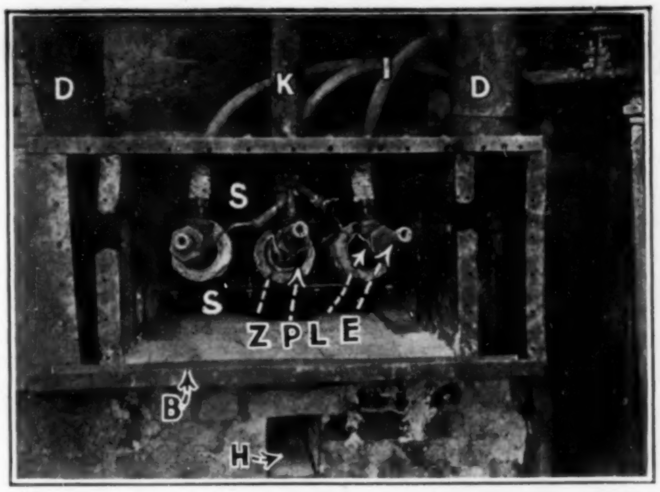


Fig. 8—Burner of Furnace at Anniston

Full safety for the operator is assured by the inclosure of the rear ends of the pyrelectrodes in a grounded steel box, the cover of which can be provided with a contact that throws out the oil switch upon opening the box.

The electric input is regulated preferably by merely sliding the rods in their tubes. Since the current of a long arc is inherently steady, there is no need for sensitiveness in this adjustment; and it has sufficed in the Anniston unit to give the three $1\frac{1}{4}$-in. rods a push of about 2 in. each, once an hour, to compensate for arcing consumption. For this purpose a varnished wooden stick is employed, and the voltage is not removed during the act. The small electrode concumption is evident, when it is recalled that the average operation has been at nearly 1,000 kw. of total power. The advancement could readily be done by a solenoid actuated from a contact-making meter. The rods are adjusted at sufficient distance from the furnace stock or bath, and in such close proximity to one another at their tips that the arcs play from each electrode and along the blast flames to their common junction in space.

Possibly one of the most interesting commercial aspects of the pyrelectric process is its relation to the advantageous consumption of central-station electricity and, in favored localities, of natural or byproduct gas. Where three or four electric furnaces, each of a few thousand kilowatts load, are now employed in a given region or art, it is not unlikely that scores of units of smaller individual but far greater aggregate load may become established in response to the opportunities and benefits of very cheap, high-temperature, high-efficiency heat.

Bureau of Mines Reorganization

Under an order approved by the Secretary of the Interior, the following-named technical divisions and offices of the Bureau of Mines have been recognized:

Division of Mining Experiment Stations, with administrative control of the stations at Pittsburgh, Pa.; New Brunswick, N. J.; Columbus, Ohio; Minneapolis, Minn.; Salt Lake City, Utah; Tucson, Ariz.; Seattle, Wash.; St. Louis-Rolla, Mo.; Birmingham-Tuscaloosa, Ala.; Reno, Nev.; Berkeley, Calif.

Division of Metallurgy, charged with the conduct of researches in physics, chemistry and engineering connected with the metallurgy, ore dressing, reduction and refining of the ferrous and major non-ferrous metals; specifically of iron, steel, copper, lead, zinc, aluminum, gold, silver and their alloys. This division will be under the direction of the chief metallurgist, who will have administrative charge of the field studies now being conducted at Miami, Okla.; Moscow, Idaho; at the Massachusetts Institute of Technology, and at the Bureau of Standards; together with the co-operative studies on oxygen enrichment of air blasts.

Division of Mineral Technology, under the charge of the chief chemist.

Division of Fuels, under the chief mechanical engineer.

Division of Petroleum and Natural Gas, under the chief petroleum engineer.

Division of Mineral Leasing, to have charge of all work of the bureau relating to leases other than oil and gas, on the public and Indian lands. This division will be under the direction of an engineer in charge, headquartered at Washington.

Division of Mining Research, charged with the duty of conducting field and laboratory research as to mining methods in relation to safety, economy and efficiency in mining. This division will be under the supervision of an engineer in charge, who will have technical supervision over all employees engaged in studies within its field and administrative control of the Urbana, Ill., staff, the Alaska staff, and such district and resident engineers as may be assigned to the work. The Division of War Mineral Supplies is abolished and its duties, records and personnel are transferred to this division.

The Safety Service, charged with the duty of disseminating throughout the mining and mineral industries the safety practices developed in or approved by the Bureau of Mines. This division will include the study, development and introduction of special mine rescue apparatus, the mine rescue work of the bureau, the mine rescue and first aid training, the making of safety service reports, the holding of safety meets and rallies, and of mine rescue and first aid meets and contests.

Chief Surgeon's Office, to be conducted by the chief surgeon, who will have technical supervision of all medical studies and studies of health hazards conducted by the bureau, and administrative control of all medical officers asigned to it. He will represent the bureau in co-operation with the Public Health Service.

Chief Explosives Chemist's Office, to be conducted by the chief explosives chemist, who will act as consultant in all studies of explosives conducted by the bureau, will approve all specifications for and tests made of permissible explosives, and will have technical supervision of the co-operation with the army, navy and other departments or institutions where the work relates to explosives.

Two Administrative Divisions, consisting of the office of chief clerk, and the information service, as now organized, shall be recognized.

George S. Rice, chief mining engineer, is relieved of most of his administrative duties and will serve as advisor to the director and assistant director on mining matters with such special duties as may be from time to time assigned to him. For the present he will be in entire charge of matters relating to co-operation with the British Government in studies of safety in mines. He will serve as chairman of the Mine Safety Board, and will have technical supervision over the studies conducted at the experimental mine at Bruceton, Pa.

Eastern Ceramists Hear Institute Proposal

Advantages of Having American Ceramic Society Function Also as Ceramic Institute Outlined by Secretary Purdy Before New Jersey Clayworkers Association

THE regular summer meeting of the New Jersey Clay Workers Association and Eastern Section of the American Ceramic Society was held at the Country Club, Trenton, June 20, with morning and afternoon sessions. Nearly 100 members and guests were present throughout the day, partaking of a fine luncheon served on the club veranda during the noon intermission.

Ceramic Institute Discussed

The morning meeting was given over largely to an address by Ross C. Purdy, general secretary of the American Ceramic Society, on the subject "A Ceramics Institute," followed by a general discussion of this matter, which is now before the main organization. The idea, as explained by the speaker, is for the present society to expand and function as the institute, in so doing linking up with other and more distinct trade organizations, which are now desirous of forming a central body, under the name noted, fundamentally for research work.

It was pointed out that the ceramic society is at present well organized for a development of this character, the main essential being sufficient funds to carry out the purpose. It would not be the idea to take research from present colleges, schools or laboratories, but rather to direct the work by means of a central organization headed by a qualified research engineer.

Discussion brought out the fact that different divisions of the American Ceramic Society are now doing essentially all that would and could be accomplished by a ceramic institute, and that only the lack of sufficient funds is handicapping a number of the divisions from proceeding in the desired way. This was illustrated in detail by Homer F. Staley, chairman of the Enamel Division of the society, who said the basic cause of the present difficulty was that a fair proportion of the dues of company members directly affiliated with the division did not accrue to the division for its work, only 10 per cent, whereas, in his opinion, 50 per cent should be directed to the respective divisions for their research activities.

It was mentioned that the American Face Brick Association, the Hollow Tile Association, the Common Brick Manufacturers Association, the National Terra Cotta Society and the Refractories Manufacturers Association, as well as two of the glass organizations, were the leading factors in the development of the plan for a ceramic institute, and as now estimated, the idea would cost about $30,000 a year to carry to fulfillment. In the case of the American Ceramic Society, this would be in addition to present expenditures, or approximately $64,500 gross per annum.

No action was taken toward approving the project by those assembled, and a suggestion for an affirmative motion of such character was lost.

The first paper of the afternoon session was by R. F. Geller, entitled, "Proposed Investigation by the Bureau of Standards in the Whiteware Field," read in his absence by A. N. Finn, also of the bureau.

The subject was introduced by a review of the work of the bureau in this line during the past 2 years, particularly with respect to raw materials. The initial investigation was that of whiting, undertaken by A. E. Williams. In this, a number of samples of American and English whiting were subjected to a series of inspections and tests, including microscopic examination, determination of the fineness of grain, partial chemical analysis, etc., with a determination of the effect of the different whitings on the softening point of ceramic bodies and the effect on the rate of vitrification of porcelain bodies. The results of these investigations showed that American whitings are apparently sufficiently fine grained for all ceramic purposes, although English whitings have considerably more fine material of a colloidal nature.

Later, the properties of ball clays were investigated by H. H. Sortwell, and it was shown that American clays are nearly equal to the English clays in plasticity and working behavior, but give less strength to the body when dry. American clays are cleaner and burn in general to a better color, hence can be used in larger amounts without affecting the color of the product, in this way overcoming in a measure their lower strength. Again, the American clays are less apt to cause trouble due to lack of oxidation of the carbonaceous matter in firing. Also, by firing to a little higher temperature, the same degree of vitrification may be obtained in a body containing domestic clay as in the same body when English clay is used. The substitution of an American clay for imported material makes a more porous body under the same firing conditions and crazing consequently develops. Successful substitution requires either a little higher firing temperature or the adjustment of the flux content of the body to secure the same degree of vitrification. The English clays, in general, have greater bonding power.

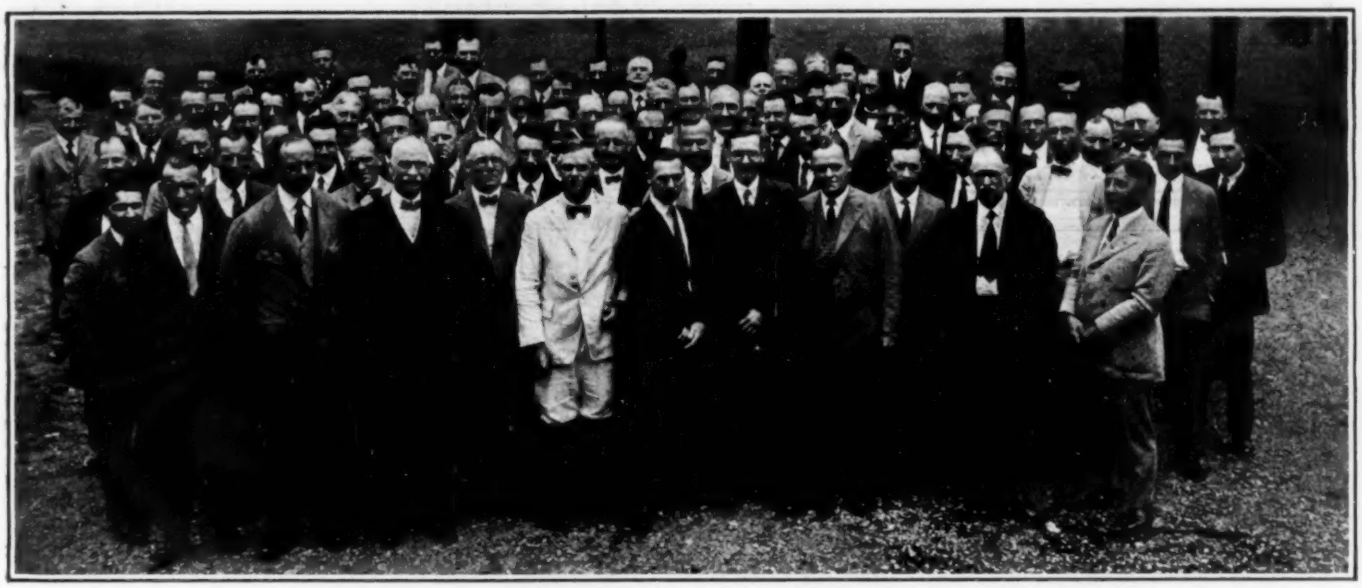
Another investigation begun by Mr. Sortwell and completed by W. L. Shearer was that of flint. This had to do with the thermal expansion of whiteware bodies using different commercial brands of flint, the results of the tests showing that the type and fineness of flint caused but slight variations in this respect. French flint did not show as great expansion as American flint on heating through a temperature region of 550 to 600 deg. C. It was found that the particular character of flint used had little influence on the prevention of dunting, although the presence of this material in the body is directly responsible for this peculiar form of cracking.

The next investigation to be carried out by the bureau is of feldspar, and while this is now only in a preliminary stage, it is expected that the work will go forward in the near future.

Humidity Drying

An interesting address followed on the subject "The Fundamentals Underlying Everyday Drying in the Ceramics Industry," by A. E. Stacey, Jr., research engineer, Carrier Engineering Corporation, Newark, N. J.

Discussing relative humidity and vapor pressures, the



New Jersey Clay Workers Association and Eastern Section of the American Ceramic Society at Trenton

speaker pointed out that correct drying was a matter of proper schedule, or the correct adjustment in rate of drying between the wet bulb and dry bulb temperatures. The wet bulb depressions are the fundamentals of drying. The humidity drier is not so much the question of bringing up to saturation or to some point near saturation, but rather one of drying material under proper conditions, with respect to both temperature and humidity, and of maintaining the highest grade of drying possible for the particular character of ceramic ware.

The danger of moisture was discussed and that of the shrinkage of ware. The conditioning period was explained and the necessity for careful adjustment in the temperature rise to conform to the various characteristics of ceramic materials. The safe rate at which a piece of ware can be dried is a matter to be determined only under actual working conditions, and the rate of diffusion in the majority of cases must be decided as a result of a series of experiments within different limits.

Commenting upon the paper, R. H. Minton, general superintendent, General Ceramics Co., Metuchen, N. J., said that the rate of drying was a very important question in connection with sanitary ware, such as his plant manufactures, or other heavy clay wares, and he pointed out that statements have been made by companies manufacturing drying machinery that such cannot be heated up safely faster than 2 deg. per hour. In his experience, a piece of ware handled in a humidity drier does not have the tensile strength of a piece dried solely on the floor. For instance, a piece of sanitary ware put through the humidity drier say in 60 hours will come out apparently perfect, yet will crack in the kiln, whereas if the same piece of ware is dried on the floor over a period of 3 to 4 weeks, 95 per cent at least of such ware will come out of the kiln without the sign of a crack. The explanation, in the speaker's opinion, deals with the rapidity of drying. A piece say 4 ft. long will shrink 2 in. in drying, and it would seem that this shrinkage within a period of 3 to 4 weeks makes a stronger piece than when taking place in 48 hours.

Casting of Heavy Pottery

The concluding paper of the session was by C. C. Treischel, R. T. Vanderbilt Co., New York, under the caption, "Practical Aspects of the Casting of Heavy Pottery Products," giving a comprehensive digest of this important subject.

It was pointed out that clay slips used in casting may be classified, according to the method of preparation, as "premixed" and "raw"; and according to the particular use, as slips for "core-casting" and slips for "drain-casting." "Premixed" slips are those made from filter press cakes, either wet or dry, the materials being mixed first for the plastic process and then remixed with water and deflocculating agents, or salts. In the case of "raw" slip the clay, non-plastics, water and salts are all mixed at the same time.

Following the preparation of the casting slip, the next important consideration is that of the addition of "salts," and in this the best practice seems to be to mix a given amount of the "salts" with a definite quantity of water, adding about three-fourths of this mixture to the water in the blunger or ball mill. Then add the body mixture and finally enough of the remaining "salts" solution to make the slip of the proper viscosity.

With regard to raw materials, it was set forth that the percentage of ball clay used for the slip at various plants varies from 5 to 25 per cent; mixtures high in ball clay cast more slowly that those of low ball clay content. Again, fat clays cast more slowly than lean clays, but add very little to the green ware strength over the lean clays. It is good practice to use two ball clays, one fat and the other lean. China clay and kaolins add to the mixture the remainder of the colloidal material, and the fineness of such clays is an important factor in their adaptability for utility in casting.

Such materials as feldspar, flint, whiting, etc., have very little effect on the casting slip. The deflocculating agents comprise waterglass, soda ash, sal soda, etc., and the alkali or "salts." Uniformity of these materials is desirable, and batches received should be checked for this purpose.

With a brief business discussion and a rising vote of thanks to the speakers of the day, the meeting was adjourned. Charles W. Crane, head of the Crossman Co., South Amboy, N. J., president of the association, presided at both sessions, with George H. Brown, director, department of ceramics, Rutgers University, New Brunswick, N. J., secretary of the organization, also in attendance.

Equipment News

From Maker and User

Temperature Gage Control

By Harold E. Trent
Philadelphia, Pa.

For the majority of heat-treating processes, temperature control is necessary, the individual process determining how close the temperature should be held. For some work a manual control is thought to be near enough, but on close analysis an automatic control is always justified by reason of being cheaper—less labor, less fuel and less failures. Of course, it is well known that more uniform results are obtained by closely held temperatures.

The foregoing remarks are practically the case for temperature control. Then the next point to be considered is, How closely shall the temperature be held? There are numerous pyrometers that can be depended upon to read within 1 to 2 per cent, but few ovens and furnaces have a uniform temperature. Platinum and platinum-rhodium couples are extremely sensitive and in congenial atmospheres maintain a high accuracy—higher than is often necessary. The main disadvantage is that the indicating instruments must be extremely sensitive and of low torque. Oftentimes the cost of such accuracy is unwarranted, especially if the thermocouple be adequately protected against local fumes, which cause the instrument indication to lag behind the applied temperatures. Then again, there is little value in having an instrument to read within 1 per cent when the oven may have 10 deg. variations. Therefore for the majority of applications dependability of action is preferable to initial extreme accuracy with uncertain depreciation.

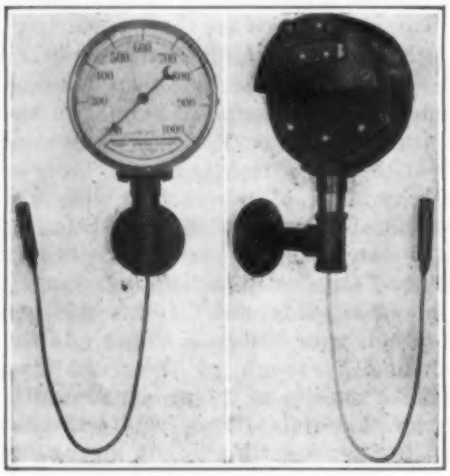


Fig. 1—Front and Rear Views of Temperature Controller

The best any pyrometer can do is to indicate the temperature at one point, and when the pyrometers are fitted with temperature control to control at a predetermined position.

In the gage control, Fig. 1, a compromise has been arrived at between the factors above mentioned, and although it has no advantage over other types in only being able to control the temperature for a definite position, it has a high torque, which enables a robust contact mechanism to be used with an accuracy of ½ scale division. In the gage illustrated the control can be set at any point from 300 to 1,000 deg. F. (full scale).

The mechanism consists of an actuating bulb working upon a steel tube spring, which in turn is geared up to a pointer. From the mechanism an extension is provided which is arranged to interlock with an electrical contactor. Special attention has been given to this contactor movement. To avoid undue load on the gage mechanism the contactor has a balanced movement. This enables a light spring to be used for holding the contacts closed and therefore the accuracy of the readings and control is maintained over entire range of the instrument.

Fig. 2 shows the contactor mechanism, which is a separate unit secured to the gage by three screws. Thus the gage is complete as an indicator without the control back, but with the addition of the back it also acts as a control.

The contacts have been made large enough to handle 15 amp. a.c. and have given good service at such rating, but to avoid the dressing of contacts it is recommended that a relay switch be provided, which may, if desired, be attached to the gage below the control or separately mounted; then the control contactor will be called upon only to handle the relay switch operating current of 10 watts.

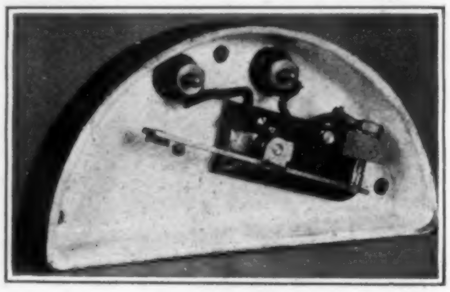


Fig. 2—Inside View of Contactor

The back of the control is furnished with a control lever, which can be locked in any position of the scale to control for any part of the scale for 300 to 1,000 deg. F.

Automatic Feed Control for Grinding Mills

In order to obtain the best results from the use of a grinding mill, it is highly important that the feed to the mill be properly and accurately controlled. Recognizing this fact, P. J. Gagnon, Jr., recently invented the Gagnon Automatic Feed Control, now marketed by the Gagnon Manufacturing Co., Appleton Bank Building, Lowell, Mass.

This device was designed primarily for use with the well-known Raymond type of mills, in order to operate them at highest efficiency with lowest labor and power costs. In the design, advantage is taken of the same principle upon which the vacuum indicator supplied with the mill operates. This indicator is used to warn the mill attendant of changes necessary in the feed, an overload in the mill increasing the

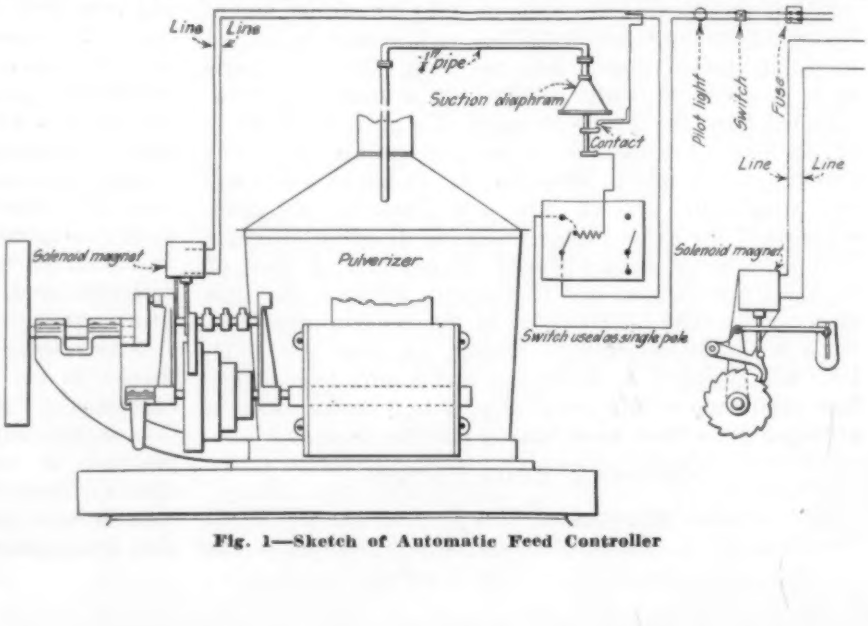


Fig. 1—Sketch of Automatic Feed Controller

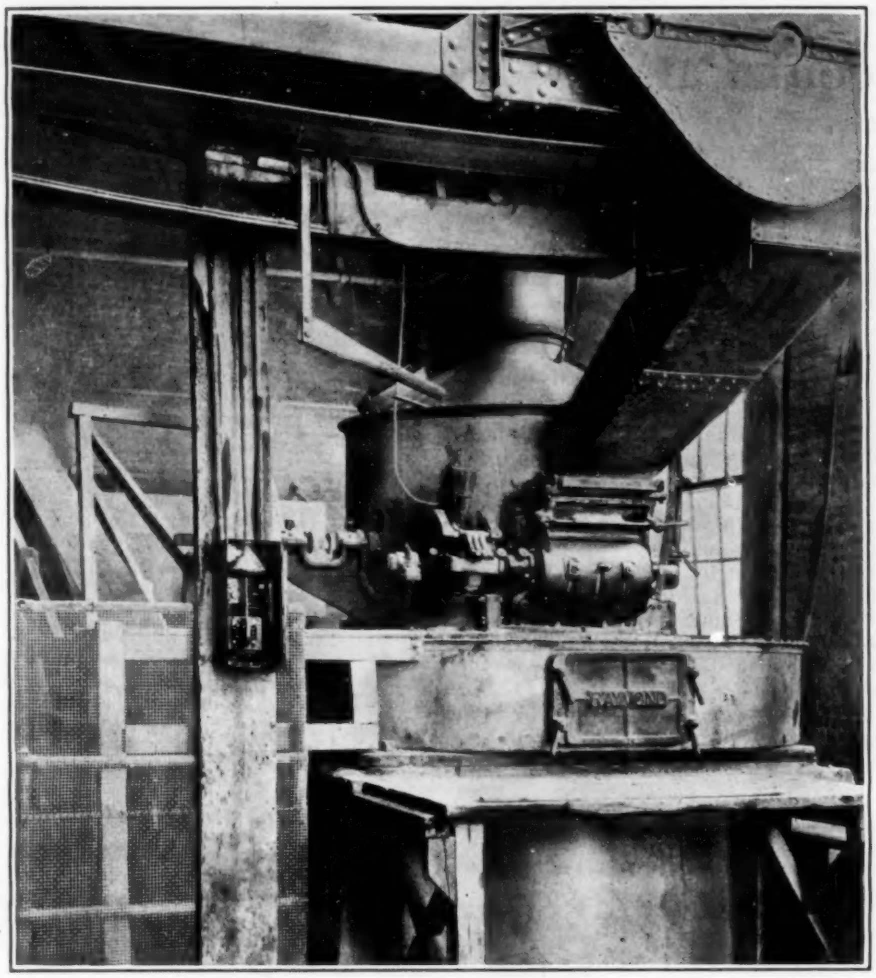


Fig. 2—Feed Control Applied to Mill

vacuum in the separation chamber indicating too much feed on the indicator and insufficient feed reducing the vacuum, which fact is also shown on the indicator.

The automatic feed control is operated by this vacuum and removes the necessity of the attendant making any changes in machine operation. It consists of a suction diaphragm connected to the separation chamber. This diaphragm is fitted with a contactor which makes or breaks an electric circuit connected to a solenoid magnet attached to a pawl on the feed roll. Any increase in vacuum in the separation chamber completes the circuit, energizes the magnet, lifts the pawl and stops the feed. As the vacuum decreases, the contact is broken, the pawl is engaged and the mill is supplied with feed. The controller can be regulated to put any predetermined amount through the mill.

It is claimed for this device that it insures a more uniform product and that it gives maximum output with minimum power and labor. Continuous operation is given and the human element is removed in the control of the mill. The control is said to work as well on a heater type mill as on a roll type. Installations have already been made on mills grinding phosphate rock, calcined petroleum coke, coal, dry white lead, arsenate of lead, lead oxide, talc, pitch, calcined magnesite, dry precipitated lime sludge, hydrated lime, rock gypsum, fluorspar and limestone.

Improving Power Factor for Industrial Plants

A static condenser of an improved design, embodying features of durability, efficiency, light weight, dimensions and cost per kva., is now on the market. This device is designed for use by central stations and industrial concerns with a view of improving the power factor of the circuit and thereby increasing the available capacity of generators and transformers, decreasing energy losses in distribution systems and improving voltage regulation, thus increasing the supply of power.

An especially high-quality dielectric is employed by the manufacturers of this device, enabling them to cut down the thickness of the layers without reduction of efficiency. As a result of this, the total size and weight have been reduced.

Among the advantages claimed by the General Electric Co., which markets this condenser, are efficiency and simplicity of operation and convenience of location. No attendant is required, the condenser being placed in operation by closing a control switch, and left on the line indefinitely with but occasional inspection. Operation is claimed to be practically noiseless. The condensers may be designed for out-of-doors or located in out-of-the-way places. There are no moving parts, thus eliminating the necessity of a special foundation.

Very low losses are also a feature of this device, the losses in 2,300-volt equipment being approximately ½ of 1 per cent of rated kva. capacity. For low-voltage equipments, a transformer is included, the losses being approximately 3 per cent.

The improved condenser consists of a number of condenser units, a reactance for dampening out the higher harmonics in the voltage wave, a discharge resistance for draining the condenser charge when disconnected from the line, and an oil circuit breaker for the control of the equipment. The number of condenser units included in an equipment is directly proportional to the capacity required. Each unit is composed of a large number of couples of metal foil with paper laminations as a dielectric. These units are mounted on a rack.

The condensers are being marketed in standardized capacities for 40 to 125 cycle circuits, 220 to 2,300 volts, in six sizes from 30 to 300 kva. For larger capacities, the complete units are arranged in tiers or banks. Weights of the standard units, without reactor and transformer, range from 805 lb. in the 30-kva. size to 5,110 lb. in the 300-kva. size.

Manufacturers' Latest Publications

Brown Co., Portland, Me.—A new catalog on the "Bermico" fiber conduit, which is manufactured by this concern. This catalog describes the product and its uses and also makes the announcement that it will be marketed hereafter by the Western Electric Co., through its many sales offices.

Pacific Distributing Corporation, 85 Second St., San Francisco, Calif.—A booklet descriptive of the refined natural salt cake produced and distributed by this concern.

Roller-Smith Co., 233 Broadway, New York City—Bulletin 150. A new catalog of type H A small portable alternating current electrical instruments.

American Blower Co., Detroit, Mich.—Bulletin 1002. A new catalog giving description and specifications for the Sirocco type of fans.

Weston Electrical Instrument Co., Newark, N. J.—Bulletin 1504-A. A new bulletin on the Weston rectangular type of instruments for alternating current switchboards.

Crouse-Hinds Co., Syracuse, N. Y.—Folder 11. A folder describing a new design of interlocking safety switch and plug.

Merco Nordstrom Valve Co., 110 West 40th St., New York City.—A binder containing several bulletins descriptive of the full line of Merco Nordstrom valves as follows: Bulletin 1, describing plug valves; bulletin 2, describing lubricants especially prepared for use with these valves; bulletin 3, describing Merco Nordstrom semi-steel straightway plug valves; bulletin 4, describing Merco Nordstrom semi-steel three-way and four-way plug valves; bulletin 5, describing miscellaneous designs of valves; bulletin 6, describing lubricated cocks made of Duriron; Bulletin 7, describing Knight-Merco plug valves made of acid- and corrosion-proof chemical stoneware.

Eclipse Fuel & Engineering Co., Rockford, Ill.—Three new bulletins describing the McKee proportional mixer for gas and air, the McKee proportional mixer for use with low-pressure air and the McKee temperature controller for use with various types of gas-fired equipment.

Weston Electrical Instrument Co., Newark, N. J.—A book entitled "Electrical Testing in Industry," written by E. S. Lincoln, consulting engineer, in co-operation with the engineering staff of the Weston Electrical Instrument Co. This book is published to set forth methods of testing which have been developed through many years work on the part of this concern.

Review of Recent Patents

Chemical Enamelware

Adjustment of enamel composition so as to have a coefficient of expansion similar to that of the iron base has given enamels that were somewhat unsatisfactory as regards resistance to corrosive action by chemicals.

Harold F. Whittaker, of Carneys Point, N. J., and Theodore Baker, of Wilmington, Del., have sought to overcome this difficulty by varying the expansion coefficient of the metal base to meet that of the enamel which is most satisfactory for a particular case. Examples of suitable alloy bases are:

	Per Cent	Per Cent	Per Cent
Iron	57.48	56.23	58.93
Nickel	42.00	36.20	39.00
Chromium	0.00	7.00	1.50
Carbon	0.10	0.10	0.10
Manganese	0.35	0.40	0.40
Phosphorus	0.03	0.03	0.03
Sulphur	0.04	0.04	0.04

The manganese is added to improve the casting qualities of the alloy.

The presence of carbon in the iron or steel, even in amounts as small as 0.10 or 0.20 per cent, has a tendency, especially with certain proportions of iron and nickel, to cause wide fluctuations in the coefficient of expansion at different temperatures; this tendency is counteracted to a certain extent if chromium is present. The use of chromium is also desirable for the reason that it facilitates an adjustment of the coefficient of expansion within certain limits. Thus for a nickel-iron alloy containing about 36 per cent Ni the coefficient of expansion varies, between 2×10^{-6} and 7.5×10^{-6}, almost directly as the percentage of chromium between 1 and 10 per cent.

Enamels for use on these bases may vary in composition within the following limits:

	Per Cent
SiO_2	67.0 to 75.0
B_2O_3	4.0 to 24.0
Na_2O	4.0 to 8.5
K_2O	0.2 to 1.3
CaO	0.2 to 7.0
MgO	0.0 to 0.5
Al_2O_3	0.0 to 10.0
PbO	0.0 to 1.0

(1,496,505, assigned to E. I. du Pont de Nemours & Co., Wilmington, Del., June 3, 1924.)

Fractional Diffusion of Gases

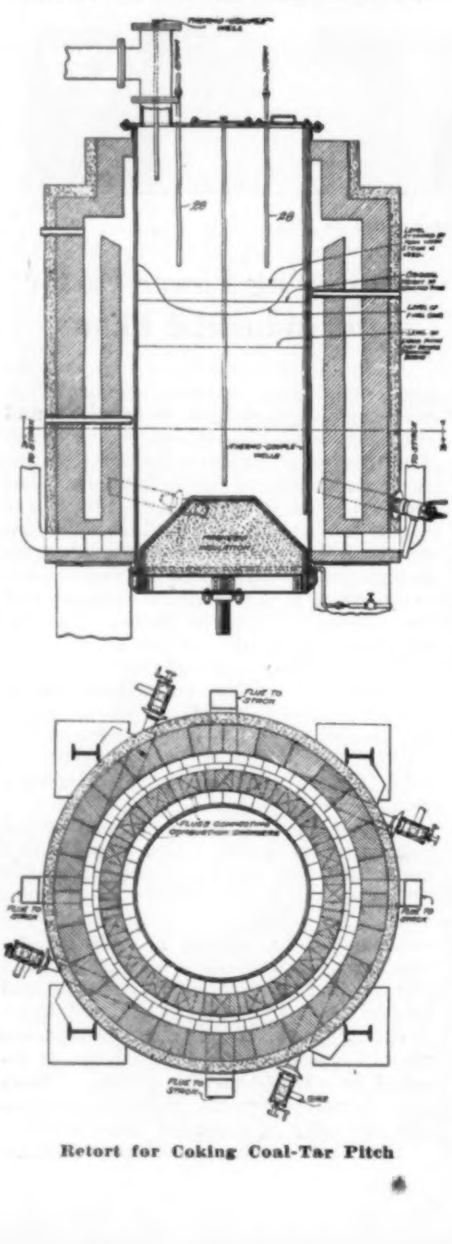
Application of Graham's law to the problem of separating certain commercial gaseous mixtures is suggested by Warren K. Lewis, Charles S. Venable and Robert E. Wilson. Instead of allowing the gases to diffuse through a comparatively dense membrane into a vacuum, a diffusion partition of pulp, felt or cross-section of wood such as spruce from which the resin has been extracted is used, pressure is kept practically the same on each side of the partition, but a stream of CO_2, dry steam or ammonia is passed through the side toward which the lighter gas diffuses in order to sweep out the diffused gas and prevent back pressure.

Separation of helium from natural gas, treatment of water gas and restoration of balloon gas that has had its lifting power impaired through diffusion of air are suggested applications. (1,496,757, assigned to Goodyear Tire & Rubber Co., Akron, Ohio, June 3, 1924.)

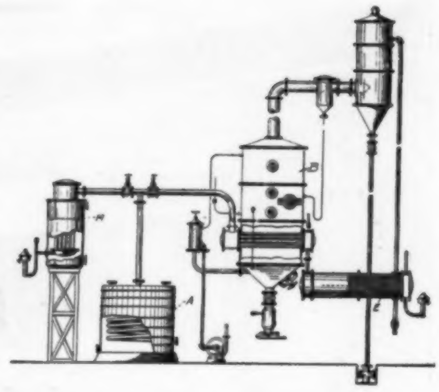
Coking Coal-Tar Pitch

Retorts on stills for coking coal-tar pitch are ordinarily made of very large dimensions as compared with the quantity of pitch treated, in order to avoid wasteful boil-overs resulting from the violent foaming of the pitch when it has melted and begun to distill. Edmund O. Rhodes and Paul Wible, of Chicago, and Ralf B. Trusler, of Pittsburgh, have found that the introduction of steam will control the foaming and have applied the idea to the retort shown.

The retort consists of a cylindrical metal shell with removable cover and bottom, the latter being filled with magnesia insulation and mounted on a threaded support for moving it into position. Two annular flues surround the retort; four tangential gas burners supply heat to the outer flue. Through the cover of the retort steam pipes 28 project to within a short distance of the desired foam level. Through these steam is introduced as soon as foaming starts, thus controlling the foam level and preventing boil-overs. (1,496,431, assigned to American Tar Products Co., Chicago, June 3, 1924.)



Retort for Coking Coal-Tar Pitch



Acetate of Lime Evaporating System

Evaporating Acetate of Lime

Harry C. Merriam, of Boston, suggests that operating economies may be effected in wood-distillation plants through the use of primary still vapors for the evaporation of acetate of lime solutions instead of using high-pressure steam for this purpose. Ordinarily the latent heat of the primary still distillate is wasted. The primary still serves to separate the volatile constituents of the crude pyroligneous acid from the dissolved tar. It is shown at *A* in the illustration. The single-effect vacuum evaporator for the acetate of lime is designated by *B*. In order to operate the evaporator continuously the vapor lines from a number of primary stills are connected with the heating chest of the evaporator. Each still has its own set of heating tubes and its own final cooler *E* so that the different runs may be kept separate. The condensers *M* ordinarily used with the primary stills are retained for emergency use. The new system may thus be installed without interfering with the operation of present equipment. (1,496,649, assigned to E. B. Badger & Sons Co., Boston, June 3, 1924.)

Motor Fuel Composition

A mixture containing 30 to 70 parts alcohol, 25 to 50 parts light petroleum distillate or benzol and 5 to 15 parts butylene is suggested for motor fuel use by Donald B. Keyes, of Baltimore, Md.

Fuels prepared in this manner will have as a rule a good starting effect, a not too rapid rate of explosion, and will be completely blended. They will have a high calorific value and yet may be manufactured commercially at low cost. It may further be mentioned that fuels which contain only one or two hydrocarbons in considerable propor-

tions give a more uniform explosion curve than in the case of complicated fuel mixtures. (1,496,810, assigned to U. S. Industrial Alcohol Co., Baltimore, Md., June 10, 1924.)

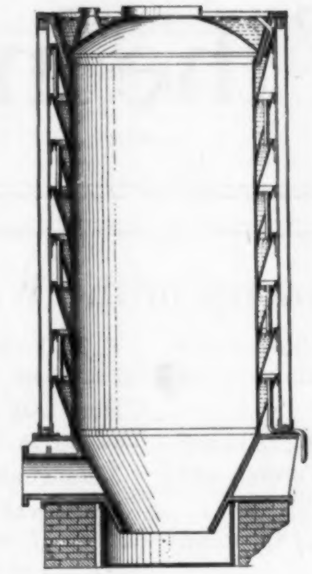
Electrolytic Chromium

Georg Grube of Stuttgart, Germany, has obtained brilliant, adherent coatings of chromium on iron, copper or brass by electrodeposition from a bath containing per liter 250 grams CrO_3, 2.25 grams H_2SO_4 and 7.58 grams $Cr(OH)_3$. (1,496,845, assigned to Metal & Thermit Corporation, Chrome, N. J., June 10, 1924.)

Vulcanizing Rubber-Latex Paper

Frederick Kaye, of Ashton-on-Mersey, England, adds soluble alkaline sulphides to rubber latex before adding the latter to paper pulp in the beater. Later sufficient acid or acid salt is added to precipitate colloidal sulphur along with the coagulated latex. When the paper passes through the heated drying rolls, vulcanization of the latex is effected by this colloidal sulphur. (1,497,146, June 10, 1924.)

Sulphur Dioxide Cooler



Sulphur Dioxide Cooler

Cylindrical lead shells set in a tank of water have been used for cooling the hot sulphur dioxide gases from pyrites or sulphur burners prior to use in the manufacture of sulphuric acid. Hydrostatic pressure has caused buckling of the shells and the use of thick lead castings has been costly.

Henry Howard, of Cleveland, has developed an interesting design for water-cooling the outside of a lead shell. The shell is made of rolled lead about ½ in. thick. A series of slightly overlapping annular troughs are fastened to the outside of the shell. Overflow pipes placed alternately on opposite sides of the shell connect the troughs. Cooling water enters the receptacle above the cover and flows down through each trough in turn. The shell is thus completely water-cooled without being subjected to excessive hydrostatic pressure. The hot sulphur dioxide enters through the large central opening in the cover. (1,497,238, assigned to Grasselli Chemical Co., Cleveland, June 10, 1924.)

Purifying Sodium Sulphide Solutions

Sodium carbonate in solutions obtained by leaching sodium sulphide black ash may be removed by adding sufficient lime to causticize the carbonate present and at the same time passing in hydrogen sulphide. It is obviously possible to use calcium sulphide instead. (1,497,563, Henry Howard, Cleveland, assigned to Grasselli Chemical Co., Cleveland, June 10, 1924.)

U. S. Patents Issued June 24, 1924

Apparatus for the Destructive Distillation of Oil-Bearing Materials. Philip T. Alexander, Sacramento, Calif., assignor of one-fourth to Arthur E. Miller, Sacramento, Calif.—1,498,528.

Method of Producing Precipitated Antimony Sulphide. George W. Mullen, Elmhurst, N. Y., assignor to Howard H. Bishop, New York.—1,498,564.

Electrode Holder. Carl W. Soderberg, Christiania, Norway, assignor to Det Norske Aktieselskab for Elektrokemisk Industri, Christiania, Norway.—1,498,582.

Apparatus for Cooling Comminuted Solid Material. Jens O. Jensen, Baltimore, Md.—1,498,630.

Retort. Floyd J. Metzger, New York, assignor to California Cyanide Co., Inc., New York.—1,498,635.

Converter. Floyd J. Metzger, New York, assignor to California Cyanide Co., Inc., New York.—1,498,636.

Method of Making Alkali-Metal Cyanide. Floyd J. Metzger, New York, assignor to California Cyanide Co., Inc., New York.—1,498,637.

Arsenical Composition and Method of Making Same. David S. Pratt, Pittsburgh, Pa.—1,498,639.

Porcelain - Enameled Table Top and Method of Making the Same. Marion N. Hurd, Frankfort, Ind., assignor to Ingram-Richardson Manufacturing Co., Beaver Falls, Pa.—1,498,657.

Process of Producing Decolorizing Material. Clarence P. Wilson, Corona, Calif., assignor to California Fruit Growers Exchange, Los Angeles, Calif.—1,498,708.

Paper-Pulp-Cleaning Apparatus. Nathan H. Bergstrom, Neenah, Wis.—1,498,716.

Method and Apparatus for Uniformly Finely Dividing Sulphur. Joseph G. Coffin, Hempstead, N. Y., assignor to Naugatuck Chemical Co.—1,498,717.

Automatic Feeder for Soap-Cutting Tables. Robert J. Jauch, Fort Wayne, Ind.—1,498,732.

Method and Apparatus for Coating Wires and the Like. Joseph E. G. Lahousse, Ternay, Isere, France, assignor to Société Chimique des Usines du Rhone, Paris, France.—1,498,738.

Method and Apparatus for Separating the Constituents of Gaseous Mixtures. Claude C. Van Nuys, Cranford, N. J., assignor to Air Reduction Co., Inc.—1,498,766.

Drying Machine. Luther C. Baldwin, Providence, R. I., assignor to U. S. Bobbin & Shuttle Co., Providence.—1,498,774.

Process of Treating Petroleum Still Gases. Benjamin T. Brooks, Bayside, N. Y., assignor to Chadeloid Chemical Co. —1,498,781-782.

Treatment of Vegetable Parchment. Arthur Hough, Summit, N. J.—1,498,797.

Process for the Production of Magnesium Chloride. Henrik Bull, Bergen, Norway, assignor to A/S de Norske Saltverker, Bergen, Norway.—1,498,833.

Reversible Regenerative Furnace. Alfred V. Kemp, London, England.—1,498,842.

Adhesive or Binding Composition and Process. Jacob S. Robeson, Pennington, N. J.—1,498,856.

Method of Manufacturing Inner Tubes. John E. Cady, Indianapolis, Ind., assignor to G. & J. Tire Co., Indianapolis, Ind.—1,498,864.

Treatment of Wood Separators. Campbell C. Carpenter, Niagara Falls, N. Y., assignor to U. S. Light & Heat Corp., Niagara Falls.—1,498,865.

Treatment of Plates for Storage Batteries. Campbell C. Carpenter, Niagara Falls, N. Y., assignor to U. S. Light & Heat Corp., Niagara Falls.—1,498,866.

Regenerator and Like Structure. Lehman V. Howard, New Brighton, Pa.—1,498,875.

Electric Furnace. Morris H. Bennett, Waterbury, Conn., assignor to Scovill Manufacturing Co.—1,498,903.

Vat Dyes of the Thioindigo Series and Process of Making Same. Richard Herz, Frankfort-on-the-Main, and Jens Muller, Hanau, Germany.—1,498,913.

Apparatus for the Distillation of Carbonaceous Materials. Thomas W. S. Hutchins, Davenham, England.—1,498,817.

Manufacture of Carbon Black, Lampblack and Other Substances. John A. McGuire, Prescott, Ariz.—1,498,924.

Joint for and Means of Supporting a Fluid-Delivering Pipe. Ernest Hill, Detroit, Mich., assignor, by mesne assignments, to General Electric Co.—1,498,968.

Means for Anode Casting. James B. Ladd, Ardmore, Pa.—1,498,971.

Machine for Treating Plastic Compounds. Fernley H. Banbury, Ansonia, Conn., assignor to Birmingham Iron Foundry, Derby, Conn.—1,498,986.

Electric Furnace. Robert Beyer, Meran, Italy.—1,498,990.

Process of Producing Hexamethylenetetramine. Carnie B. Carter and Albert E. Coxe, Pittsburgh, Pa., assignors to S. Karpen & Bros., Chicago, Ill.—1,499,001.

Process of Producing Hexamethylenetetramine. Carnie B. Carter, Pittsburgh, Pa., assignor to S. Karpen & Bros., Chicago, Ill.—1,499,002.

Reversing Valve for Furnaces. Haakon Hellan, Bellevue, Pa.—1,499,017.

Electric Furnace. Johann E. Leonarz, Tacubaya, Mexico.—1,499,020.

Process of Treating Cellulose. Fritz Moeller, Cassel, Germany.—1,499,025.

Coke Oven. Tokusaburo Sato, Osaka, Japan.—1,499,033.

Method of Processing Silk. Albert R. Thompson, San Jose, Calif.—1,499,038.

Direct-Fired Tunnel Furnace. Foord Von Bichowsky, Glendale, Calif.—1,499,042.

Making Gray Iron. Augustus F. Meehan, Chattanooga, Tenn.—1,499,068.

Paint and Varnish Remover. Carleton Ellis, Montclair, N. J., assignor to Chadeloid Chemical Co.—1,499,101.

Highly Concentrated Stable Solutions of Sulphurous Acid and Method of Producing It. Emanuel Felheim, Berlin-Lichtenrade, Germany.—1,499,164.

Clay-Products Drier. Robert T. Kyle, Huntington, W. Va.—1,499,227.

Grinding Machine for Oil Varnish and Other Paints. Georg Lenart, Bonn-on-the-Rhine, and Paul Lenary, Darmstadt, Germany.

Composition for Hardening Steel. William C. Bassett, Long Beach, Calif.—1,499,285.

Process of Making Compressed Fiber Board. Herman M. Castner, Nobleboro, Me.—1,499,291.

Electric Furnace. Robert Beyer, Meran, Italy.—1,499,317.

These patents have been selected from the latest available issue of the "Official Gazette" of the United States Patent office because they appear to have pertinent interest for "Chem. & Met." readers. They will be studied later by "Chem. & Met.'s" staff, and those which, in our judgment, are most worthy will be published in abstract.

Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.

News of the Industry

Summary of the Week

Court of Customs Appeals upholds constitutionality of applying American selling price to ascertain value of imported competitive dyes.

Guy C. Riddell has been appointed head of the newly created Minerals Division of the Bureau of Foreign and Domestic Commerce.

Last minute plans of American Institute of Chemical Engineers for summer trip are announced.

F. M. Feiker sails to England to investigate advertising methods for benefit of American firms.

New beet sugar mill in Minnesota gives stimulus to industry in that territory.

Metal enameling firms reported in merger.

Statistical reports from manufacturers show that production of acetate of lime and methanol have been curtailed but stocks are larger than they were last year.

Denver Meeting of A.I.C.E. Proves Attractive

Additional Arrangements Announced for Convention, July 15-18, and Extended Western Trip

Late reports from the office of Dr. J. C. Olsen, secretary of the American Institute of Chemical Engineers, are to the effect that almost a hundred chemical engineers and their guests will be in the party that leaves New York City July 12 for the sixteenth semi-annual meeting to be held in Denver, Colo., July 15 to 18. A score of members residing in the Middle West are expected to join the Eastern group following the sightseeing tour and entertainment arranged for the 9-hour stopover in Chicago.

R. W. Shafor, vice-chairman of the Denver committee, has sent a personal invitation and a copy of the program of the meeting to more than 300 chemists and engineers residing in Colorado. It is expected that a considerable number of these will be attracted to the sessions, particularly since beet sugar and other Western chemical engineering industries are to feature the several discussions. In addition to the technical papers included in the program as printed in the June 16 issue of *Chem. & Met.*, it is now announced that C. T. Bragg, of Detroit, will discuss the Dolbear system for the extraction of potash and borax from the brines of alkaline lakes and A. R. Chandler, of Los Angeles, and Gustav Egloff, of Chicago, will have a paper on recent developments in the Californian petroleum industry. The du Pont company's motion picture films, "Dynamite at Work" and "An American Dye Works," will be shown on Wednesday evening, July 16, at which time President Charles L. Reese of the Institute will give a short talk on the manufacturing operations involved in producing dyes and explosives.

Following the meeting in Denver a party of fifty or more is expected to continue the trip to Colorado Springs, Yellowstone and Pacific coast. At the joint meeting with the American Chemical Society in Los Angeles on Aug. 1 papers on the application of hydrometallurgical equipment in chemical industries and in sewage disposal are to be presented by J. V. N. Dorr and Frank Bachmann.

Feiker to Study Advertising Problems in Britian

In order to enable the American producer to advertise his goods properly to the British consumer, F. M. Feiker, formerly of the McGraw-Hill Co., Inc., and now connected with the Society for Electrical Development, has been designated by Secretary of Commerce Hoover to make an intensive study of British advertising methods.

Mr. Feiker will visit the industrial centers of England to collect material that will enable the American advertiser to present his wares successfully through the printed word to the British consumer in competition with the merchants of other countries.

In announcing Mr. Feiker's mission, the Department of Commerce said:

"Many serious and humorous mistakes are now being made by American advertisers in attempting to convince British buyers of the merits of their goods through the printed word. Many other Americans have little idea of the proper methods to employ in getting the best advertising results in England.

"Great Britain is America's most important export market. Recently there has been a flood of inquiries for more up-to-date information on the subject of effective advertising, and Mr. Feiker, because of his long experience in this line of work, has been selected by the department as an ideal man to gather in the information needed to put 'Made in U. S. A.' over the top in the British Isles."

American Selling Price for Imported Dyes Upheld

In a decision rendered June 28, the Court of Customs Appeals upheld the constitutionality of applying American selling price as a means of ascertaining the value of imported dyes which are competitive with domestic productions. The constitutionality of imposing the American selling price, which in most cases is higher than the foreign value, or the United States value as defined in the tariff act, was assailed by Kutroff, Pickhardt & Co., importers.

This firm of importers had appealed to the Court of Customs Appeals on four cases involving decisions adverse to the firm in different importations of dyes. All the cases were reversed by the court and remanded to the Board of General Appraisers for further proceedings, on the ground in each case that the board, and the appraiser below it, had not proceeded along the lines laid down by the tariff act in considering these protested cases. The reversal was not on the question of appraisal but purely on the technical grounds of the method of procedure. The cases that were appealed involved shipments of crystal violet, benzo-red, indra-blue and azoflavine.

The decision in the azoflavine case was rendered for the court by Judge Smith. On the question of constitutionality of American selling price and United States value, as defined in section 402 of the tariff act, and applied in paragraph 28, dealing with coal-tar products, the opinion said:

"Congress was strictly within its rights in fixing an ad valorem rate of duty on imported coal-tar products and in defining the American selling price or United States value as the value to which that rate should be applied. Whether the power to lay duties and collect them was well or badly exercised in the enactment of paragraph 28 and section 402 is not for us to say—that is a political, not a juridicial, question."

News in Brief

International Paper Co. to Expand—The International Paper Co., New York, has preliminary plans under way for early expansion, and to carry out the proposed projects it is purposed to arrange for a bond issue, it is stated, of close to $10,000,000. The work will include the construction of a new mill at Batiscan, Que., to be used exclusively for the production of newsprint, or expansion of the present mill at Three Rivers, Que., with the installation of two new paper machines and auxiliary equipment, still to be determined. An interest will also be secured in a going Canadian paper mill company, and expansion developed in pulp and paper production at this works. Tentative plans are also under consideration for further hydro-electric power development in different districts, for service at company pulp and paper mills. A. R. Graustein was recently elected president of the company.

Aluminum Co. Absorbs Rolling Mills—The Aluminum Co. of America, Pittsburgh, Pa., will take over and consolidate the Aluminum Rolling Mills Co., following the refusal of the United States Circuit Court of Appeals to grant an injunction to restrain the company from such action. The plant heretofore has been held by the Cleveland Metal Products Co., Cleveland, Ohio, which initially acquired the Aluminum company's interest in the rolling mills, but which has since discontinued the manufacture of aluminum cooking utensils. The new owner expects to develop production in the near future.

Canadian Pitch Sent to France—The Dominion Tar & Chemical Co. has just commenced the shipment of pitch to France with the loading of 4,000 tons. Should the use of domestic coke develop in Canada, as it is expected, the output of byproducts would be so increased that the plants of this company will have to be enlarged. The company has a contract for the supply of 1,000,000 gal. of creosote to the Canada Creosote Co., of Trenton, Ont., and is at present shipping 10,000 gal. daily.

Oklahoma Oil Co. Goes to Pure Oil—The Pure Oil Co., Pure Oil Bldg., Columbus, Ohio, is completing negotiations for the purchase of the properties and plant of the Oklahoma Producing & Refining Corporation of America, Inc., Tulsa, Okla., with refining plant at Muskogee, Okla. The transfer is expected to take place early in August. The purchasing company will continue the operation of the refinery and will develop maximum output at the plant soon after acquisition.

Feldspar Deposits to Be Studied—Beds of feldspar, which have been reported on the north shore of the St. Lawrence, especially around Manicouagan, are to be subjected to study and their real value established. In recent years there have been finds of feldspar reported from time to time on the north shore. Promoters have manifested their intention of starting exploitation if the mineral proves of real value. J. E. Perrault, Minister of Colonization and Mines, has retained the services of W. Erlonborn, a geologist of McGill University, who will prepare a detailed report.

Pittsburgh Chemists Have Outing—The Pittsburgh (Pa.) Section of the American Chemical Society held its annual outing at "The Pines," near the city, on June 21, with an estimated attendance of more than 350 members and guests. Athletic sports, dinner and vaudeville were the features of the event, which was in charge of C. Norman Reis, chairman of the entertainment committee of the section, assisted by a committee headed by Alexander Silverman, professor of chemistry, University of Pittsburgh.

Straw Pulp Plant Under Way—The company which has been formed to manufacture pulp from straw near Winnipeg is to be known as the Canadian Chemical Pulp & Paper Co. It is planned to erect a mill with a capacity of 50 tons a day and employing about 200 men immediately and more in the near future. Samples of pulp and paper made from Manitoba straw are at present on exhibition in Winnipeg and are admitted to be of excellent quality.

German Dyes Sold at Concessions in Belgian Markets

Coal-tar dyes are not manufactured in Belgium, and interest is confined to one or two enterprises that carry out mixing. One-half of the consumption is employed by textile enterprises and the remainder by professional finishers and dye houses. About 65 per cent of the total Belgian consumption consists of twelve dyes, important in the following order: Indigo, sulphur black, chrome black, acid black, direct black, diazo black B. H. N., naphthylamine black, alizarin red paste, diamine fast yellow, benzo purpurine 4B, fast acid cyanine and chrysophenine.

Commercial Attaché S. H. Cross in a report from Brussels says that about 90 per cent of the Belgian dyestuff requirements are furnished by Germany. The competitive position of American dyes has been impaired by the exchange situation and by low prices fixed by the French authorities on reparations dyes, which have frequently been sold in the local field as much as 50 per cent under the world market price. The whole trade is under the control of the government, and will undoubtedly remain so as long as deliveries of reparations dyes continue.

The importation of dyes is subject to license, which was established in 1922, with a view to limiting the importation of French dyes and preventing dumping of reparations dyes by resellers established in France. Up to August, 1921, the Reparations Board had fixed the quotas of each country, but since that time Belgium has had a separate agreement with the German cartel, authorizing the Belgians to draw eventual supplementary supplies over and above the quota originally fixed. While prices were originally based on the lowest German quotation for home consumption, the present arrangement entails supplying one-half of the deliveries to Belgium at the home market price and the other at the lowest foreign market price prevailing at the time of delivery.

The Belgian Government supplies the trade with dyestuffs through the intermediary of the eleven former Belgian agents of the various German producers. These distributors, while acting in behalf of the government, receive a commission of 10 per cent on the price invoiced by the government, if their individual transactions do not exceed 1,000,000 francs annually, but which is reduced by 2 per cent if their turnover exceeds this figure. The Belgian authorities fix the price at which the agents sell, and while profits in some cases are considerable, an effort is made to equalize, as much as possible, the sales prices with the world market level. It is conceded, however, that the prices of officially distributed German dyes run about 20 per cent under those for the same dyes obtained through ordinary commercial channels.

The margin of profit to the Belgian Government was particularly large during the period of passive resistance, when stocks of dyes were confiscated by the occupying authorities and actually marketed below the German production costs. Chrome blacks worth 40 francs per kilo, for example, were sold at 5 francs per kilo.

In view of the extent of coke production in Belgium, benzol is produced in fairly large quantities, the annual output approximating 15,000 tons. The largest producer, Evence-Cappee & Co., located at Haine St. Pierre, manufactures about 50 per cent of the country's production of benzol, which is exported almost entirely to France.

Toluol is sold to local chemical plants in small quantities, but there is no local import or export market for coal-tar crudes, with the possible exception of creosote, which is exported in small amounts. Prices of coal-tar products in Belgium follow the British market price and are quoted in sterling.

Guy C. Riddell to Head New Minerals Division

Secretary Hoover has announced the formation of a new division in the Bureau of Foreign and Domestic Commerce for the service of the petroleum, metal and mining industries of the United States. It is to be known as the Minerals Division and will be headed by Guy C. Riddell, consulting engineer, of Rye, N. Y., and former metallurgical advisor to the U. S. Tariff Commission. The new division will involve the consolidation of the present petroleum division with nonferrous metals section of the Iron and Steel Division. Mr. Hoover expresses the hope that the Minerals Division will develop a broad and useful service to the metal and mineral industries of the country.

Washington News

Acetate of Lime and Methanol Production Declines

The output of acetate of lime and methanol was considerably curtailed in the first 5 months of the year as compared with the corresponding period of 1923. Details of production, shipments and stocks, based on reports from manufacturers and issued by the Department of Commerce, show the following:

	Acetate of Lime (in Lb.)		
	Production	Shipments (or Use)	Stocks, End of Month
Jan.	13,420,193	9,022,250	23,401,511
Feb.	13,172,610	8,548,032	27,622,967
March	14,107,411	9,027,539	32,370,329
April	12,650,393	12,002,295	30,534,533
May	11,538,625	8,101,546	33,985,853

	Methanol (in Gal.)		
	Production	Shipments (or Use)	Stocks, End of Month
Jan.	705,747	642,812	2,632,633
Feb.	689,503	681,057	2,738,308
March	741,505	617,949	2,749,818
April	673,746	602,457	2,656,211
May	599,202	636,122	2,615,144

Phosphate Rock Rail Rates Unreasonable

The Interstate Commerce Commission has decided that rates on 320 shipments of phosphate rock from Mount Pleasant, Columbia and Siglo, Tenn., to New Albany, Ind., over the Louisville & Nashville R.R. since March 1, 1920, were unreasonable and unduly prejudicial.

The commission also declared unreasonable and prejudicial rates on petroleum and its products, including gasoline, shipped by the Transcontinental Oil Co. over the Pennsylvania and connecting railroads from Point Breeze, Pa., to Fresh Pond, N. Y.

Hudson to Head Simplified Practice Division

William A. Durgin, who for two and a half years has been at the head of the Division of Simplified Practice of the Department of Commerce, has left his government activity to resume his former post with the Commonwealth Edison Co., of Chicago, from which he was borrowed by Secretary of Commerce Hoover when the latter established the Division of Simplified Practice to help industry eliminate waste through the reduction of excess varieties. He is being succeeded by Ray M. Hudson, who has been assistant chief of the division since it was created. Mr. Hudson, before coming into the division, was for some years connected with the automotive industry and was formerly with the Franklin Automobile Co., of Syracuse, N. Y., and later with the Holt Manufacturing Co., of Peoria, Ill.

Under Mr. Durgin's direction a large number of industries have made a thorough study of their production and sales with the co-operation of the Division of Simplified Practice, and the results have been placed before groups of producers, distributors and consumers for action. As a direct result of this co-operation, which was done without police or inquisitorial powers of government, the division assisted about thirty industries to make reductions of excess varieties ranging from 60 to 90 per cent. Out of this reduction, the groups affected report more and better business than ever before, lower production costs, decreased sales expenses, smaller inventories, decrease of seasonal employment, broader markets, quicker turnover of business and better service to the consumer—along with lower prices in many cases.

Cuba Changes Formula for Denaturing Alcohol

A report from Commercial Attaché Charles H. Cunningham at Havana says that a decree was signed on June 5, altering formulas for denaturing alcohol in Cuba. All alcohol in stock which has been denatured with formaldehyde and naphthalene will have to be denatured again in accordance with the new formulas. The required formulas may be obtained by properly qualified firms and individuals upon application to the Chemical Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

Vegetable Oil Industry Develops in Sweden

The Swedish vegetable oil industry has shown rapid development within recent years, according to a report from Consul Walter A. Leonard. In practically every line of the industry production shows an increase over that of pre-war years, and there is a marked change in the import trade in the basic raw materials. An export trade is being gradually developed, and although exports are small, they show a steady increase.

Soya-bean oil production has shown a particularly marked development. Before the war only a few hundred kilos of soya beans was imported yearly, while now considerable quantities are required to supply the three factories producing the oil. It is estimated that in 1923 approximately 50,000 of the 54,557 tons of soya beans, vetch and peas imported was soya beans—almost double the import of 1922—which means a corresponding increase in the production of soya-bean oil, as there appears to be no re-exportation of soya beans from Sweden.

The growth of the domestic industry does not seem to have greatly affected the imports of foreign soya-bean oil, which average between 4,000 and 5,000 tons a year, but an export trade has developed, principally to Norway, which increased from 228 tons in 1922 to 1,170 tons in 1923. Of the 1923 exports, 506 tons went to Norway, 278 tons to Denmark and 263 tons to Germany, with smaller amounts to other European countries. As production of soya-bean oil has increased, the imports of soya-bean cake, which were considerable before the war, have become negligible. Instead, there was in 1923 an export of this product of 1,851 tons, chiefly to Denmark, with smaller quantities to Latvia and Esthonia. Prior to the war Denmark was the chief source of supply of soya-bean cake imports into Sweden.

Production of linseed oil has also increased. Imports of linseed in 1923 reached 30,595 tons, which is a record figure. As there is practically no export of linseed, the importation is consumed in the domestic industry in the 7 linseed-oil factories. Production figures for 1923 are not available, but it is estimated that the 1921 record figure of 9,807 tons has been exceeded. Imports of linseed oil have decreased, and it is evident that the Swedish domestic industry is striving to become the sole source of supply for the domestic market.

Imports of copra, which were negligible before the war, increased to 12,282 tons in 1923. This indicates an increase in the production of coconut oil produced and refined in the 7 Swedish factories making or refining this oil. Imports of unrefined coconut oil, which prior to the war came chiefly from Germany, have decreased, and the small amount now imported is supplied by the Dutch refineries. Exports of coconut and palm-kernel oil amounted to 2,100 tons in 1923, of which 935 tons went to Germany and 447 to Great Britain, with smaller amounts to other European countries.

Assistant Petroleum Chemist

The United States Civil Service Commission announces a competitive examination for position of assistant petroleum chemist. Receipt of applications will close Aug. 5. The examination is to fill a vacancy in the Bureau of Mines, for duty at Midwest, Wyo., and vacancies in positions requiring similar qualifications, at an entrance salary of $2,400 a year. Advancement in pay may be made without change in assignment up to $3,000.

Applicants must have been graduated with a bachelor's degree from a college of recognized standing, such degree requiring the completion of at least 118 semester credit hours, of which at least 30 semester credit hours must have been in chemistry. In addition, applicants must have had at least 2 years of experience in work of either a research or technical character in petroleum chemistry, which experience must show that degree of progression necessary for the successful performance of the duties of the position.

One year of graduate work, including the completion of 30 semester credit hours, the major part of which must have been in petroleum chemistry, will be accepted in lieu of each year of the required experience.

The duties consist of general research in connection with the manufacture, production, and development of petroleum and its products.

Competitors will not be required to report for examination at any place, but will be rated on their education, training, experience, and fitness; and publication or thesis to be filed with the application.

Metal Enameling Firms Reported in Merger

Plans are said to be in progress for the merger of a number of prominent companies in the metal enameling industry, the amalgamation to include at least five such interests, according to preliminary negotiations, and the purchase outright of a total of seven other companies. It is said that a parent company, capitalized at close to $25,000,000, representing the gross valuation of plants, will be formed to carry out the proposed consolidation. The main unit of the merger is expected to consist of the Falcon Tin Plate Co. and the Republic Stamping & Enameling Co., both of Canton, Ohio; Columbian Enameling & Stamping Co., Terre Haute, Ind.; Belmont Stamping & Enameling Co., New Philadelphia, Ohio, and the United States Stamping Co., Moundsville, W. Va. As to the companies to be purchased and consolidated, these are stated to be the American Stamping & Enameling Co., Massillon and Bellaire, Ohio; Coonley Manufacturing Co., Chicago, Ill.; Canton Stamping & Enameling Co., Canton, Ohio; Vollrath Co., Sheboygan, Wis.; Strong Enamel Co., Sebring, Ohio; Federal Stamping & Enameling Co., Pittsburgh, Pa., and the Polar Enameling Association, Sheboygan, Wis.

To Build Beet Sugar Plant in Red River Valley

A definite stimulus has been given the beet sugar industry in Minnesota by the announcement that the Red River Sugar Co., with a capitalization of $2,000,000, is to build a new plant at East Grand Forks to be ready for operation at the beginning of the 1925 campaign.

A site of 80 acres, lying between the Great Northern and Northern Pacific railroads and with an ample water supply available from the Red River, has been selected for the location of the plant and the work of construction will begin shortly. The factory will be of 1,000 tons daily slicing capacity.

Decision to locate the new plant at the point selected was reached as the result of practical experience in beet growing in this part of the Red River Valley during the past 7 years and after a careful study of soil and climatic conditions. During the present season 4,000 acres of beets is being grown in territory immediately surrounding the factory location selected. These beets will be hauled across the state to the Minnesota Sugar Co.'s plant at Chaska next fall and assurances already received from growers guarantee sufficient acreage for a full run of the new plant next season.

The new enterprise is being directed by men identified with the Minnesota and Northern sugar companies, who will have associated with them prominent financiers of this city and of the section in which the factory is to be located. H. A. Douglas, president of the Minnesota Sugar Co. and the Northern Sugar Corporation, is president of the new company, and its board of directors will include C. S. Mott, Flint, Mich.; J. E. Larrowe and Sherman E. Hill, Detroit, Mich.; H. P. Bend, St. Paul, Minn., and L. E. Flink, Chaska, Minn. Announcement will be made shortly of the names of Minneapolis and Grand Forks business men who will become members of the board.

Delahanty Reviews the German Dyestuff Industry

One of the secrets of Germany's prewar success in dominating the world's dyestuff markets is revealed in a publication just issued by the Bureau of Foreign and Domestic Commerce entitled "The German Dyestuff Industry," by T. W. Delahanty, assistant chief of the Chemical Division, in pointing out and showing graphically the remarkable organization which the German dye trust has built up during the past 50 years. The publication at this particular time, when the German industry is striving desperately to regain her pre-war predominant position, is especially opportune.

What is the German Dye Cartel (Interessen Gemeinschaft)? Even those in our own dye industry who should be conversant with the organization and its ramifications display but a meager knowledge.

A unique feature in answer to this query is the presentation of a chart by the author showing for the first time the companies and plants owned in whole or in part by the dye cartel, as well as the control, management, stock and interlocking directorate features. This chart is supported by a historical review from the inception of the industry up to and including the amalgamation of interests and a map showing the location of every charted factory.

Mr. Delahanty points out that the name "German Dye Cartel" is not indicative of the scope of its holdings, for this organization owns or controls not alone the entire dye production facilities of Germany but all chemical products that enter therein, from the source of the raw material, organic or inorganic, to a multitude of finished products, including fertilizers, disinfectants, gases, medicinals, tanning materials, serums, vaccines, perfumes, accelerators, photographic materials, solvents, electrometallurgical products, etc.

What is the significance to the public of such names as Badische, Bayer, Hoechst or the names alizarine and indanthrene? This publication clarifies news items which have formerly meant but little to those who were not actively engaged in the industry; and for those of our domestic manufacturers, in view of the current interest in the progress of the industry in Germany, it presents a background that enables them properly to interpret information emanating from that country.

The factors that have brought about the success of that industry not alone as a whole but as individual companies thereof and the limitations placed upon expansion are presented for the purpose of serving as a guide to our domestic dyestuff industry.

Recorded in tabular and graphical form is the dye-group production of each member of the cartel, together with an analysis of its potential. In these graphical outlines may be noted, for instance, the effect of the French occupation of the Ruhr upon the production of each type of dye in the various factories as well as the effect of the various licenses and economic restrictions in vogue in the various competing countries at the present time, which are steadily breaking the hold that Germany has had upon the consuming requirements of the world.

Grasselli Sponsors Research on Timber Preservation

Director E. R. Weidlein, of the Mellon Institute of Industrial Research of the University of Pittsburgh, has announced the founding of an industrial fellowship on the treatment of timber. This research, which is being sustained by the Grasselli Chemical Co., of Cleveland, Ohio, and is being conducted by Dr. A. M. Howald, has for its purpose a study toward improvement of the methods of applying zinc chloride in the wood-preservation industry.

Investigational work which was begun during 1923 will be continued throughout the present year. An experimental wood-impregnating plant is maintained for practical tests of processes. Research is at present being done under the supervision of Dr. Howald on the development of a method of increasing the permanence of zinc chloride treatments of timber by the addition of petroleum oils.

Trade Notes

J. H. Redding, of The Niger Co., Inc., New York, has returned from a trip to the United Kingdom.

Rayner & Stonington, Inc., importer and exporter of vegetable oils, chemicals, etc., has been organized to succeed the firm of J. H. Rayner & Co., New York. E. H. Stonington is president of the new company, Henry Kassner treasurer, J. B. Cleaver manager, and S. C. Coyne secretary.

Mountford S. Orth has applied for associate membership to the New York Produce Exchange. Mr. Orth is well known in the chemical and oil trades.

J. J. Farabellas, of the U. S. Bronze Powder Works, and T. J. Buckley, of the Lansing Asphalt & Chemical Co., have been admitted to membership in the Paint, Oil and Varnish Club of New York.

Howard Elting, former president of the National Paint, Oil and Varnish Association, has resigned from the presidency of the Heath & Milligan Manufacturing Co., of Chicago.

The Druachem Club of New York will hold a golf tournament at the Maplewood Country Club on July 17.

Lester Leland, who has been associated in an official capacity with the United States Rubber Co. for the past 25 years, has resigned from that company.

Men You Should Know About

HAROLD ALMERT, consulting engineer, of Chicago, was elected president of the American Association of Engineers at the recent annual convention in San Francisco. Mr. Almert is a charter member of the association.

ROBERT J. ANDERSON has resigned as metallurgical engineer of the U. S. Bureau of Mines and is now engaged in general consulting engineering practice, specializing in the metallurgy of aluminum. He can be addressed at P. O. Box 111, Fenway Station, Boston, Mass.

Dr. WILLIAM W. BAUER is now technical superintendent of the Milwaukee plant of the Pittsburgh Plate Glass Co.

A. S. BURNS, of Indianapolis, Ind., chemical engineer for the city, gave an address on the subject of "Asphalt" before the members of the local Scientech Club, Chamber of Commerce Building, June 23.

Dr. SAMUEL P. CAPEN, chancellor of the University of Buffalo, gave an address before the members of the local Optimist Club, at the Hotel Lafayette, June 23. He urged the establishment of a strong engineering school in the city, with particular reference to chemical engineering, owing to the marked development of that branch of industry locally.

Dr. W. E. KAUFMAN has accepted a responsible position at the Meadows plant of E. I. du Pont de Nemours & Co., Newark, N. J. During the past year he was head of the department of chemistry in Hiram College, Hiram, Ohio.

DAVID T. SHAW has resigned his position as a supervisor in the indigo plant of E. I. du Pont de Nemours & Co. at Deepwater Point, N. J. His plans for the future have not been announced.

E. A. MCKEIZY and R. A. MACDONALD have been elected vice-presidents of the General Refractories Co., Philadelphia, Pa.

LEMUEL V. REESE, formerly associated with the American Metal Co., Ltd., as chief engineer of its U. S. Metals Refining Co. plant at Carteret, N. J., has resigned and is now general manager of the Erie City Iron Works, at Erie, Pa.

Calendar

AMERICAN CERAMIC SOCIETY, summer meeting and tour, July 21 to Aug. 18.

AMERICAN CHEMICAL SOCIETY, sixty-eighth meeting, Cornell University, Ithaca, N. Y., Sept. 8 to 13.

AMERICAN ELECTROCHEMICAL SOCIETY, Detroit, Oct. 2 to 4.

AMERICAN ENGINEERING STANDARDS COMMITTEE, executive meeting, New York, July 12.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, Denver, Colo., July 15 to 18.

AMERICAN SOCIETY FOR STEEL TREATING, Boston, Sept. 22 to 26.

NATIONAL SAFETY COUNCIL, thirteenth annual congress, Louisville, Ky., Sept. 29 to Oct. 3.

WORLD POWER CONFERENCE, London, June 30 to July 12.

R. A. WAHL, engineer for the Portland Cement Association, gave an illustrated lecture on the manufacture of cement before the members of the Kiwanis Club, Penn-Harris Hotel, Harrisburg, Pa., June 26.

NICHOLAS KOPP, vice-president and general manager of the Pittsburgh Lamp, Brass & Glass Co., Pittsburgh, Pa., has sailed for a trip to Europe, to be absent several weeks. He is accompanied by his wife and daughter.

J. EDWARD WILSON is now connected as technical associate with the H. H. Welch Co., New York, manufacturing jeweler.

Obituary

WILLARD I. GAHRIS, president and general manager of the Limoges China Co., Sebring, Ohio, died suddenly on a railroad train en route to New York, June 19, aged 42 years. Mr. Gahris had been prominent as a manufacturing potter for a number of years past. He is survived by a daughter.

WILLIAM E. HITEMAN, president of the Hiteman Leather Co., West Winfield, near Utica, N. Y., and well known in that industry, died suddenly while giving an address before his employees, June 20.

NATHANIEL M. JONES, of Bangor, Me., prominent in the paper and pulp industry for many years throughout New England, died June 22 after a brief illness, aged 66 years. He was identified at various times with a number of companies in the industry, among these being the Howland Mills, Howland, Me.; Katahdin Pulp & Paper Co., Lincoln, Me.; Consolidated Pulp & Paper Co., Nashwaak Pulp & Paper Co., and mills at Au Sable Forks, N. Y., Fort Edward, N. Y., and Lockport, N. Y. Mr. Jones was the inventor of a concrete lining for digesters used in sulphite mills. He served 2 terms in the Maine State Legislature.

G. C. REW, of the Calumet Baking Powder Co., died on June 10 at his California home.

CHARLES A. REYNOLDS, of Moorestown, N. J., a prominent leather manufacturer, died at the Hahnemann Hospital, Philadelphia, Pa., June 23, aged 54 years. He had been ill for about a year. At an early age he started a small leather plant at Camden, N. J., and soon afterward founded the Keystone Leather Co. in Philadelphia, Pa., with factory in Camden, of which he remained president until 1922. At that time he resigned to form another company, known as the C. A. Reynolds Co., with leather plant in Camden. Mr. Reynolds is survived by his wife, a son and two daughters.

FREDERICK TROWBRIDGE, vice-president and Western manager of the American Aniline Products Co., New York, died at San Francisco, Calif., June 15, while on a business trip to the Pacific coast. His death was caused by heart trouble and was unexpected. He was 53 years of age, and had been connected with the company since 1920. Previously he was associated with the National Aniline & Chemical Co. in Chicago and Kansas City. Mr. Trowbridge is survived by his wife and one son.

Glass-Making Plants Increase Operating Activities

Production is being advanced at a number of glass plants in different parts of the country and it is expected that before many weeks other plants will increase materially their present basis of operation. The Standard Plate Glass Co., Pittsburgh, Pa., operating several plants in western Pennsylvania, is running full at all works, giving employment to regular working forces; it is planned to maintain this schedule indefinitely. The Economy Glass Co., Morgantown, W. Va., is on a full-time production basis in its blowing department, with work advancing in the cutting shops. The Blackford Window Glass Co., Vincennes, Ind., is operating at its new local plant for the manufacture of a good grade of commercial sheet glass, and will maintain operations at all eight of its drawing machines. The Lippincott Glass Co., Alexandria, Ind., manufacturer of chimneys, globes, etc., is operating on a full-time schedule with regular working force in the cutting department, with advancing outputs in other divisions of the works, including punch shops. Following a merger of the John B. Scohy Glass Co. and the Independent Glass Co., both of Sisterville, W. Va., under the name of the Scohy Sheet Glass Co., arrangements are being perfected for full operations at the works, only to be interrupted by proposed expansion plans to cost approximately $100,000, including the installation of considerable additional machinery. John B. Scohy heads the consolidated company.

Synthetic Resin in France

At a recent conference given by M. Georges Kimpflin before the French Society for the Encouragement of National Industries interesting information was given regarding the situation of synthetic resin in France. The industry was founded by M. Trillat, who in 1896 first developed the foundation principles previous to the invention and industrialization of Bakelite in the United States.

Synthetic resin is produced today in France to the extent of 100 tons per month, said to be one-fifth of the American monthly production and a third of the German production for a like period. An increased French output is looked for within a short period. The increase in the use of this product in France is considered to be entirely due to the progress made in electrical equipment and development. Other fields of application are looked for and an effort is to be made toward perfecting methods of production with a view to making French consumers independent of foreign sources of supply.

Quiet Market for Chemicals Throughout June

Slowing Up in Manufacturing Lines Has Forced Further Curtailment in Chemical Production

With the exception of an improved demand for certain specialties, the market for chemicals was quiet throughout the past month. Production continued along moderate lines and even restricted outputs failed to prevent some accumulations at producing points. The position of some consuming industries was less favorable than in the preceding month. Various reports, in which different methods of computation are followed, agree that production of basic commodities and factory employment have been on a declining scale. Consumers of chemicals who are not covered ahead by contracts have clung to the policy of buying only for immediate needs and trading in the open market has been limited to small lots. The movement of chemicals against contracts has shared in the general business depression with the result that deferred deliveries have been requested and in some cases contract goods have been resold in the open market.

The weighted index number shows an average of 153.62 for June, which compares with 152.95 for May. An analysis of price changes, however, indicates that the higher level was reached mainly through the influence exerted by some allied products, of which cottonseed oil was most prominent. Chemicals, as such, were not in a firm position even though current prices were admitted to be relatively low and very close to production levels. The apathy of buyers developed an irregularity in prices which was apparent more clearly whenever desirable business was in prospect. This condition is, perhaps, natural following a protracted slow buying movement but it was noted that sellers were not taking the initiative in bringing buyers into the market and expressed the opinion that further reductions in price would not overcome the handicap imposed by declines in operations among consuming industries.

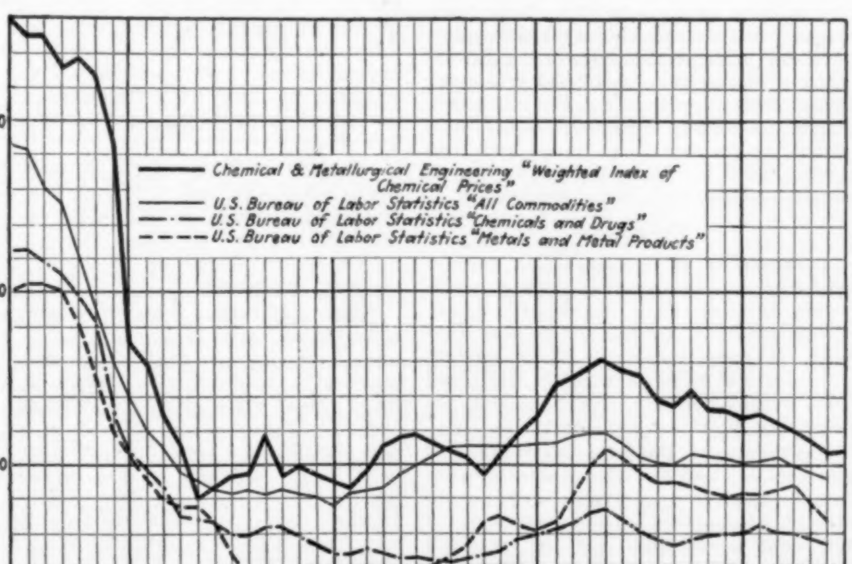
Imports of chemicals have held up to about the same levels as in the months immediately preceding. This fact also is attested by the competition which has existed between imported and domestic chemicals. In some instances, notably in the case of arsenic, copper sulphate, caustic potash, chlorates, citric and tartaric acids, the lowest prices prevalent in our markets applied to the foreign-made goods. Latest official figures for the import and export trade in chemicals are for the month of May. Imports were lower in value than the total for April but exports gained over the April figures largely as a result of a material increase in outward shipments of coal-tar chemicals. Comparisons on a quantity basis are unfavorable for recent imports and exports as lined up against those for the corresponding periods of last year. Arsenic is one of the selections which offers an exception to the above and in view of the failure of calcium arsenate to move as freely as expected, it is evident that imported grades of arsenic have had much to do with depressing values for that commodity.

The principal development in tariff matters was found in a final hearing on June 23 into production costs of casein. A hearing on this subject had been held last fall and data collected by the Tariff Commission was made public. Further investigation had been ordered and additional data compiled by the commission was presented at the recent hearing. This is a material on which petitions have been entered both for an increase and for a reduction in the present duty. The contending parties have been given until July 10 to file briefs and it is possible that shortly after that date the commission will be in a position to make recommendation to the President. It was also announced that representatives had been selected to investigate vegetable oils and work in foreign markets has been started.

The Bureau of Labor reports that the downward swing to wholesale prices which developed late in 1923 continued through May. The bureau's weighted index number, which includes 404 commodities or price series, declined to 147 for May, compared with 148 for April and 156 for May, 1923.

Decreases in farm products and metals were chiefly responsible for the drop in the general price level, although all other groups except foods likewise showed a decrease. Among farm products there were substantial reductions in corn, oats, rye, cattle, sheep, hay, hides, milk, tobacco and wool. In metals iron and steel products, copper, lead, tin and zinc averaged less than in April. Other important commodities showing price decreases were sugar, lard, raw silk, worsted yarns, bituminous coal and coke, crude and refined petroleum, Douglas fir lumber, red cedar shingles, carpets, cattle feed, hemp and sole leather. In the food group increases in fresh meats, flour and certain fruits offset the decreases reported for other articles, leaving no change in the general price level.

Comparing prices in May with those of a year ago, as measured by changes in the index number, it is seen that the general level has declined nearly 6 per cent. In all groups prices averaged lower than in May, 1923, ranging from a little over 2 per cent in the case of farm products to nearly 11 per cent in the case of building materials and nearly 12 per cent in the case of metals and metal products.



Financial

The Heyden Chemical Co. reports for the year ended Dec. 31, 1923, a net loss of $3,165, as compared with a net profit of $30,500 in 1922. The net sales totaled $808,336, as compared with net sales of $899,931 for the previous year.

Plans of reorganization of the Bay Sulphite Co., of Toronto, are making progress. It is rumored that present company bonds will be unchanged but preferred and common stock will be affected materially in the reorganization.

The Corn Products Refining Co. has declared quarterly dividend of 50 cents on $25 par value common shares, and regular quarterly dividend of $1.75 on the preferred. Common is payable July 19 to stock of record July 3 and preferred July 15 to stock of record July 3.

A report from Montreal says plans are reported to be well under way for International Paper Co. taking over the Riordon Co., a Canadian newsprint company now in reorganization. In this connection it is pointed out that A. R. Graustein, International Paper's new president, has been active in reorganization of Riordon and is still a member of the bondholders' committee.

Market Conditions

Surplus Stocks of Calcium Arsenate Weaken Selling Prices

Failure of Southern Buyers to Operate Actively Induces Producers to Grant Concessions—Trading in General Remains Quiet

WHILE comparatively large amounts of calcium arsenate have been sold this season, the market is in a weak position due to reports of a large unsold surplus in producers' possession. Prices have been irregular for some weeks but advices from Southern distributing points indicate that dealers have been selling at low levels and the unsettled position of the market is further shown by reports of low-priced offerings at producing points. Arsenic, which has responded to the decline in arsenate, was steadier in the past week and sold more freely for deliveries over the balance of the year.

Demand for chemicals has shown but little change in the period and reports from consuming industries are not favorable to an immediate improvement in buying activity. Paper, leather and textile trades are especially quiet, but the soap trade was taking on supplies in a more liberal way. Generally speaking production is going ahead on a lessened scale and the consequent decline in consumption of chemicals is affecting the output of the latter. With few exceptions producers are not carrying large stocks and while buyers are still in a position of advantage, it is generally held that lower prices for chemicals would not act as a stimulant on the trading movement.

Returns of the Department of Commerce place exports of chemicals and allied products in May at nearly 23 per cent in excess of those for April. This comparison is based on value but with the slight changes in market prices between those months, it is evident that a somewhat similar result would apply to quantity comparisons. Imports in May were below the April totals, with the decline distributed among different divisions, including dyes and fertilizer chemicals.

Acids

The prominence of domestic sellers of citric acid was emphasized toward the close of the preceding week when a decline of 1c. per lb. was announced, making the sales price 46c. per lb. for crystals and 47c. per lb. for powdered. This brings the price practically to the same basis as that ruling for the imported and the latter is reported to be less subject to price shading than in recent weeks. Import figures show that receipts of foreign citric acid in the first 5 months of the year were 472,096 lb. as compared with 479,132 lb. in the corresponding period of last year. The increased use of imported tartaric acid is shown by the fact that imports for the January-May period, inclusive, were 1,527,872 lb. as compared with 530,312 lb. last year. The increase in imports is said to be due to a decline in domestic production rather than to an increase in consumption. Moderate buying is reported for tartaric with imported held at 27@28c. per lb. and the home product at 30c. per lb. Imports of oxalic acid for the first 5 months of the year have been below those of last year and the activity of domestic producers has given them a large share of the business and has served to keep prices low enough to discourage heavy importations. Current prices for oxalic are 9¾@11c. per lb. according to seller and quantity. Acetic acid is quiet with large consumers covered ahead. Prices are easy but no open changes in price have been made. The anhydrides also are quiet with no price developments. Call for lactic acid has been less brisk and some large consumers have cut down requirements materially. Mineral acids have failed to improve in tone and can hardly work into a better position until surplus stocks have been worked off.

Tin Salts Advanced in Price—Arsenic Steadier—Citric Acid Lower—Formaldehyde Easy—Methanol Reduced — Copper Sulphate Weak—Caustic Soda Steady—Naphthalene Offered Freely — Calcium Arsenate Pressed for Sale — Prussiate of Soda at Concessions

Potashes

Bichromate of Potash—The import situation is slow and outward shipments in May were but 91,167 lb. as compared with 198,883 lb. in May last year. Present buying is along moderate lines but stocks are fairly well held and quotations are 9¼@9½c. per lb. according to seller and quantity.

Carbonate of Potash—Scattered lots were in demand but there was no sustained buying and prices are barely steady. Importers offer calcined 80-85 per cent at 5¾@6c. per lb., calcined 96-98 per cent at 5¾@6c. per lb.. and hydrated 80-85 per cent at 6@6¼c. per lb.

Caustic Potash — Imported caustic potash still commands a premium for shipment from foreign markets but the quiet call for spot goods holds the market at 6¼c. per lb. Imports in May were 792,639 lb. as against 1,489,354 lb. in May, 1923.

Permanganate of Potash—The market has undergone no change during the week. Buying is said to be restricted to small lots. Asking prices are held at 14@14¼c. per lb. for all positions. Foreign markets are reported as steady and domestic material appears to be favored on future deliveries.

Prussiate of Potash—Yellow prussiate of potash is maintaining the steady position which has featured the market for many weeks. The lowest price heard from importers is 18½c. per lb. for spot material. Sales are said to have been made at that figure and bids below that level have failed to find sellers.

Sodas

Bichromate of Soda—Reports of small stocks in sellers' hands were again current last week and the market seemed to be a little firmer. In some quarters 7⅝@7¾c. per lb. was quoted but it was possible to do 7½c. per lb. Buying is not active and production is still held down to low levels. Withdrawals against contracts are taking up the greater part of production and new business is largely for nearby delivery.

Caustic Soda—Some improvement in consuming demand was reported last week both for home and for export. Very little change in prices was noted but sellers who were credited with being willing to shade 2.90c. per lb. in the previous week were asking 2.90@3c. per lb. The export price as generally quoted by producers is 3@3.05c. per lb. The contract price for domestic delivery holds at 3.10c. per lb. at works. Exports in May were 6,237,549 lb. as compared with 11,269,945 lb. in May, last year.

Fluoride of Soda—An easy tone has prevailed due to lack of buying interest. Imported fluoride in the spot market was offered at 8½c. per lb. and shipments were offered on a parity with the spot quotation.

Nitrate of Soda—Spot offerings were reported to be freer due to arrivals but unsold stocks are still small and the market is holding on a fairly steady level. Spot nitrate is held at $2.60 per 100 lb. Futures are offered at $2.37 per 100 lb. and call for spot goods is held down because of the premiums which are asked over late deliveries. Imports have not been running heavy and there is some speculation regarding the future position of spot prices although lower prices are expected.

Nitrite of Soda—Imports of nitrite in May were 623,640 lb. a good part of which passed direct to consumers. Offi-

cial figures for June imports are not yet available but are said to have been light and the spot supply has been held down to moderate sized lots. A firm feeling has prevailed in the market and while 8⅜c. per lb. is given as a possible trading basis, the majority of sellers are asking 8½c. to 8⅝c. per lb. for spot material.

Prussiate of Soda—There were sales of imported prussiate of soda on spot at 9⅝c. per lb. Buying was slow and some sellers were eager to dispose of their holdings. Toward the close of the week low priced offerings were more difficult to find and the general asking price was advanced to 9⅝c. per lb. for spot goods. Shipments from abroad were quoted at 9½c. per lb. but bids under that figure were invited. Imports of prussiate in May were 189,411 lb. as compared with 100,263 lb. in May, last year.

Miscellaneous Chemicals

Acetate of Lime—Official figures give production of acetate of lime in May at 11,538,625 lb. and shipments at 8,101,546 lb. This shows a decline in output for the month but as shipments also fell off, stocks at the end of May were 33,985,853 lb. as against 30,534,533 lb. for the preceding month. Export trade in May gained in volume with shipments reaching a total of 3,248,745 lb. Asking prices are holding unchanged at $3 per 100 lb.

Arsenic — Considerable business is said to have been put through during the week. Sales were made at prices ranging from 7¾c. to 8¼c. per lb. A car of domestic arsenic is said to have sold at the outside figure. Demand also was reported for later deliveries and business for delivery over the balance of the year was taken at 7¾@8c. per lb. Imported grades on spot appeared to be firmly held and factors in the trade stated that no offerings were on the market under 7½c. per lb. Imports have held up to previous standards and arrivals from abroad in May were 2,386,871 lb. This makes a total importation of 21,059,019 lb. for the 10 months ended May.

Bleaching Powder—Exports of bleaching powder in May were 1,751,228 lb. which compares with 2,959,905 lb. for May, last year. Domestic consumption, likewise, is on a reduced scale but the weakness in price which depressed the market a year ago has been lacking and any accumulations at works are not being pressed for sale. Occasional reports are heard of low priced sales but first hands are holding quotations at $1.90 per 100 lb. for large drums, carlots, at works. Liquid chlorine is reported to be finding new outlets in consuming trades and is quoted at $4.50 per 100 lb. in tanks at works.

Calcium Arsenate—Reports of large stocks at producing centers appear to be borne out by developments in the market. Advices from the South state that dealers have been selling at 10c. per lb. and it is also stated that some first hands have sold at 9c. per lb. in carlots at works and at 9½c. per lb. delivered at Southern distributing points. As high as 10c. per lb. is quoted for goods at works and the price appears to vary according to seller. Some reports say that larger amounts had been sold for delivery to Southern buyers than had been commonly supposed and producers who had been holding back for late buying were disturbed by the activities of other sellers and pressed sales at low prices in order to reduce stocks on hand.

"Chem. & Met." Weighted Index of Chemical Prices

Base = 100 for 1913-14

This week	155.05
Last week	155.09
July, 1923	171.00
July, 1922	156.00
July, 1921	148.00
July, 1920	274.00
July, 1919	231.00
July, 1918	277.00

The decline in citric acid, tin products and methanol checked the upward tendency in the weighted index number, the total for the week being 4 points lower. Higher prices obtained for crude cottonseed and linseed oils.

Formaldehyde — Lower prices for methanol have brought about an easier tone in the market for formaldehyde. Competition among sellers also is keen and in most cases sellers are willing to meet competition. Asking prices run from 9c. to 9½c. per lb. but small lots have sold at the inside figure and there were rumors that round lots could be bought as low as 8½c. per lb. at works.

Tin Salts — The average price for Straits tin in June was 42.765c. per lb. This shows an advancing tendency and producers of tin salts announced a higher sales price for July deliveries on tin crystals and tin bichloride. The former is now held at 33c. per lb. and the latter at 12¾c. per lb.

Alcohol

The feature in the market was the reduction in prices for methanol. The undertone has been easy for some time now, notwithstanding the restricted output, and the decline of 5@6c. per gal. did not surprise traders. On the revised schedule pure is quoted at 75c. per gal. in tank cars, 78c. per gal. in drums, and 83c. per gal. in bbl. The 95 per cent grade is available at 74c., in bbl., and the 97 per cent grade at 76c., in bbl., carload lots.

Denatured underwent no further change, leading producers offering the No. 5, 188 proof, at 41@42c. per gal., in drums, carload basis. The special No. 1, 190 proof, closed at 42@43c. per gal., in drums.

Coal-Tar Products

Limited Production of Benzene Finds Ready Market—Refined Naphthalene Available at Concessions—U.S.P. Phenol Unsettled

GENERAL conditions in the market for coal-tar products underwent little change in the past week. Producers say that the production of benzene is hardly sufficient to meet requirements and the prices, while quotably unchanged, are in a firm position. The call for phenol has been less pronounced and several producers appeared more anxious to meet the views of buyers. The spot market for U.S.P. phenol was unsettled. There was selling pressure in white naphthalene and distressed lots sold at concessions. Demand for aniline oil was slow, yet producers held out for full prices. Cresylic acid was barely steady on liberal spot offerings. There was an unsettled market for technical benzaldehyde, ortho-toluidine and pyridine.

Aniline Oil and Salt—Slow business was reported in aniline oil, but first hands maintained prices on the old basis of 16c. per lb., carload lots, prompt shipment from works. Aniline oil for red was nominal at 40c. per lb. The salt was barely steady at 22@23c. per lb.

Benzene—Production of benzene continues light, reflecting general curtailment in coke oven operations. Stocks are barely sufficient to meet contract requirements and the market is firm in all directions. Leading factors quote 23c. per gal. on the 90 per cent material and 25c. per gal. on the pure, tank cars, f.o.b. works. According to official figures the exports of benzene in May amounted to 23,538,244 lb., which compares with 15,824,024 lb. in May a year ago.

Creosote Oil—The imports of creosote or dead oil in the month of May reached the total of 7,328,553 gal., which compares with 6,826,925 gal. in May, 1923. Imports for the 11 months ended May 31 amounted to 67,943,573 gal., which compares with 47,057,813 gal. for the corresponding period a year ago. The English markets were easy, with offerings at 6¾@7d. per gal., tanks, works.

Cresylic Acid — Demand moderate and prices unsettled as producers appeared to be anxious sellers. Nominal quotations on the 97 per cent grade ranged from 63@68c. per gal., according to seller and quantity, while on the 95 per cent grade 58@63c. represented the market.

Naphthalene—Weakness was in evidence, some holders forcing sales at concessions. White naphthalene deteriorates in warm weather and this accounts for some of the pressure on the market. White flake sold at 4½@5c. per lb., the inside figure obtaining on round lots. Small parcels could have been picked up at 4¾c. Chips held at 4¼@4½c., with intermediate makers showing no interest in the market. Crude was nominal at 2c. per lb., forward delivery, c.i.f. basis. Imports of crude naphthalene for the 11 months ended May 31 amounted to 13,952,587 lb., which compares with 11,322,611 lb. for the corresponding period a year ago.

Phenol — Only small lots changed hands and prices were barely steady. Sales of U.S.P. material took place at 26½@27½c. per lb., in drums, immediate delivery. On nearby material first hands offered fairly large quantities to regular buyers at 26c. per lb.

Vegetable Oils and Fats

Higher Prices for Crude Cottonseed Oil—Spot Linseed Advances—China Wood Oil Unsettled—Good Call for Tallow

INTEREST centered in the cotton crop report issued on Wednesday by the Department of Agriculture. This indicated a crop of 12,144,000 bales, which compares with 10,128,476 bales for 1923. The condition of the crop as of June 25 was placed at 71.2 per cent of normal, as against 65.6 per cent a month ago. The news brought out much bearish sentiment on new crop oil, but the old crop positions in the speculative market held relatively firm. Linseed oil for immediate and nearby delivery was raised 2c. per gal. China wood oil sold at lower prices on additional offerings of distressed material. Soap makers took on tallow at an advance in the price. Greases were firm.

Cottonseed Oil—The old crop months made new highs for the movement on buying for refiners as well as speculative interests. Refined prime summer yellow, July option, sold well above 11c. per lb., but reacted later on the cotton report, which turned out better than expected. The condition of the crop was put at 71.2 per cent of normal, which compares with 65.6 per cent a month ago and 69.9 per cent a year ago. The area planted to cotton is officially placed at 40,403,000 acres, comparing with 38,709,000 acres a year ago. Crude oil was in scanty supply and sales took place at prices ranging from 9¼@9½c. per lb., tank cars, f.o.b. mills. Bleachable oil was advanced ¼c. per lb. to 10¼c. per lb., tank cars, f.o.b. mills, Texas common points. Lard compound was inactive, but firm at 12½@12¾c. per lb., carload basis. Pure lard in Chicago, cash, settled around 10.80c. per lb. Stocks of lard in the Chicago district on July 1 amounted to 92,002,701 lb., which compares with 71,255,332 lb. on June 1 and 62,601,967 lb. a year ago.

Linseed Oil—Before the close of the week all crushers advanced the price for July-August oil to 96c. per gal., in bbl., carload lots, a net gain of 2c. September delivery was raised to 94c. per gal., with October at 90@92c. per gal. October-December was offered in several directions at 88c. per gal., but consumers could not be interested. The fact that foreign oil was available for future delivery at concessions from the prices named here restricted business. According to private advices from abroad at least 1,200 tons of English oil were sold to American buyers in the past 2 weeks. The cake market strengthened in sympathy with corn and bids at $36 per ton, f.a.s. New York were turned down. Crop news from the Northwest was good and the trade is anxiously awaiting the first report for the season, which will be made public on July 9. Duluth quoted July flaxseed at $2.39½ per bu., which compares with $2.42 per bu. a week ago. Buenos Aires flaxseed sold for prompt shipment at $2.10 per bu., c.i.f. New York. Demand was good. At Buenos Aires, on Wednesday, the July option settled at $1.80 per bu. Stocks of seed at Canadian terminals are placed at 427,000 bu., which compares with 218,000 bu. a year ago. According to reports the holdings in Canada are in very firm hands, and there is little likelihood of any forced selling from this direction.

China Wood Oil—The market was irregular, forced sales taking place at a liberal reduction in the price. On the Pacific coast offerings of tank cars appeared at 10¾c. per lb., nearby positions, which compares with 11½c. a week ago. In New York one parcel of spot oil sold at 11½c. per lb., but most traders refused to quote less than 12@12½c. per lb., depending upon the quantity.

U. K. Imports of Oilseeds

Imports of oilseeds into the United Kingdom for the 5 months ended May 31, with a comparison, follow:

	1924	1923
Linseed, tons	182,246	194,897
Rapeseed, tons	38,012	27,798
Cottonseed, tons	251,264	278,074
Sesameseed, tons	7,439	2,990
Soya beans, tons	61,348	73,042
Copra, tons	38,274	36,227
Peanuts, tons	72,227	69,890
Palm kernels, tons	100,603	93,578
Castorseed, tons	10,849	5,467

Corn Oil—Sales of several cars of crude took place at 9¼c. per lb., tank cars, Chicago, an advance of ¼c. for the week. Offerings were light.

Coconut Oil—Most of the large producers took on quite a little business in the past month and offerings are no longer so numerous. The buying interest, however, has subsided. Nominally the market for Ceylon type oil held at 8@8¼c. per lb., sellers' tanks, f.o.b. Pacific coast, all positions. In New York the tank car quotation held at 8½c. per lb. Copra was firm at 5@5¼c. per lb., c.i.f. Pacific coast ports. In the past week there were heavy arrivals of Manila oil at New York.

Olive Oil—Denatured olive oil sold at prices ranging from $1.15@$1.20 per gal., in bbl. Prime green foots closed steady at 9½c. per lb., with a moderate inquiry in evidence.

Palm Oils — Foreign markets were unchanged, but continued strength in tallow strengthened the views of sellers here. Niger oil on spot sold at 7¼c. per lb.; on futures 7c. might still be done. Lagos was nominally unchanged at 7¾c. per lb.

Rapeseed Oil—Quite a little refined oil was disposed on spot at prices ranging from 76@79c. per gal., in bbl. Late in the week oil afloat was offered at 77½c. per gal., with futures nominal at 77½@78½c. per gal.

Sesame Oil—Refined oil in drums was available at 11½c. per lb., prompt shipment from abroad, c.i.f. terms. For oil in cooperage 11c. was asked, forward delivery.

Soya Bean Oil — Inquiry developed for crude oil for July shipment from the coast, but bids at 10c. brought out no sellers. The nominal quotation was 10¼c. asked, tank cars, duty paid, f.o.b. San Francisco.

Menhaden Oil — Fishing along the Atlantic coast was good and with the fish oiling better than 5 gal. offerings are gradually increasing. There were sellers of crude at 40c. per gal., tank cars, f.o.b. point of production, but buyers held off.

Tallow, Etc.—Approximately 500,000 lb. of extra special tallow sold to soap makers at 7½c. per lb., f.o.b. melters' plants, New York, an advance of ¼c. for the week. Oleo stearine was traded in at 12¼c., an advance of 1c. per lb. Yellow grease was raised to 6¾@7c. per lb. Choice white grease firm at 9½c. per lb.

Miscellaneous Materials

Antimony — Trading inactive, but steady primary markets supported prices here. Arrivals have been smaller of late. Chinese and Japanese offered at 8¾c. per lb. Cookson's "C" grade 12¼c. per lb. Chinese needle, lump, nominal at 8½@9c. per lb. Standard powdered needle, 200 mesh, 9@10c. per lb. White oxide, Chinese, 99 per cent, 10@10½c. per lb.

Barytes—Demand about normal, according to reports from producing centers, and no important price changes expected for the remainder of the year. Crude nominal at $8 per ton, Missouri mines. Georgia mines quote $9 per ton. Ground off color, $13 per ton, Baltimore. Water ground, floated, bleached, $23 per ton, f.o.b. cars, packages included, f.o.b. St. Louis.

Bauxite — Domestic, crushed and dried, $5.50@$8.75 per ton, f.o.b. shipping point. Pulverized and dried, $14 per ton. Calcined, crushed, $19@$20 per ton. Foreign quoted at $5@$7.50 per ton, c.i.f. New York.

Glycerine—There was a firm market for dynamite glycerine, the prices ranging from 16@16½c. per lb., carload basis, drums included, the top figure obtaining in New York. Chemically pure held at 16½@17c. per lb., carload basis, drums included. Crude was in light supply at 10½@10⅝c. per lb., loose, carloads, f.o.b. points in the West.

Lithopone—No further change occurred in the market, first hands asking 6@6¼c. per lb., carload lots, in bags. Arrivals of foreign material were reported during the week.

Naval Stores—Spirits of turpentine advanced 2c. per gal., the market closing at 84c., in bbl., carload basis. Rosins were in fair request and slightly firmer, though quotably unchanged on the basis of $5.55 per bbl. for the lower grades.

White Lead — The official contract price for pig lead was unchanged at 7c. per lb. Demand was slack all week. The call for lead pigments also was inactive, but no changes were announced in the selling schedule. Standard dry white lead held at 9¾c. per lb., in casks or bbl., carload lots.

Zinc Oxide — With no important change in the metal, prices for oxide held on the former basis of 7¾c. per lb. for American process, lead free. French process was nominally unchanged at 9¾c. per lb. for the red seal.

Imports at the Port of New York

June 27 to July 2

ACIDS—Cresylic—47 dr., Glasgow, E. H. Watson. **Oxalic**—20 csk., Hamburg, A. Klipstein & Co.; 66 csk., Hamburg, A. Klipstein & Co.

AMMONIUM CHLORIDE—44 bbl., Antwerp, A. Klipstein & Co.

AMMONIUM NITRATE—102 csk., Hamburg, Kuttroff, Pickhardt & Co.

ANTIMONY SULPHIDE—24 cs., Bordeaux, Reichard-Coulston, Inc.

ANTIMONY REGULUS—500 cs., Shanghai, Irving Bank-Col. Trust Co.

ANTIMONY ORE—478 bg., Antofagasta, W. R. Grace & Co.

ARSENIC—700 csk., Hamburg, Ore & Chemical Corp.; 200 csk., Hamburg, Guaranty Trust Co.; 114 cs., Antwerp, Order.

BARIUM CHLORIDE — 56 bbl., Hamburg, Innis, Speiden & Co.; 156 bbl., Hamburg, Roessler & Hasslacher Chemical Co.; 68 csk., Antwerp, Guaranty Trust Co.

BARYTES—500 bg., Hamburg, E. Bullock & Sons; 200 bg. and 25 csk., Hamburg, A. Klipstein & Co.; 100 bg., Bremen, Seaboard National Bank; 75 csk., Rotterdam, Schall Color & Chemical Co.

BLEACHING POWDER—125 cs., Liverpool, H. Kohnstamm & Co.

BRONZE POWDER — 12 cs., Bremen, Ohio Bronze Powder Co.; 2 cs., Bremen, American Express Co.; 3 cs., Bremen, Order; 4 cs., Havre, W. R. Noe & Sons.

CASEIN—1,666 bg., Buenos Aires, Order; 834 bg., Buenos Aires, Bank of the Americas; 834 bg., Buenos Aires, National City Bank; 1,084 bg., Buenos Aires, Order.

CALCIUM SULPHITE—13 cs., Bremen, Mallinckrodt Chemical Works.

CHALK — 2,000 bg. ground, Antwerp, Cooper & Cooper; 500 bg. do., Antwerp, Reichard-Coulston, Inc.; 250 bg., Antwerp, C. B. Chrystal & Co.; 350 bg. Antwerp, L. H. Butcher & Co.; 500 bg., Antwerp, A. Salomon & Bros.; 650 tons (in bulk), London, Baring Bros. & Co.; 80 bg., London, Chemical National Bank; 555,000 kilos crude, Dunkirk, Taintor Trading Co.

CHEMICALS—40 pkg., Hamburg, Pfaltz & Bauer; 224 bg., Glasgow, Brown Bros. & Co.; 280 bg., Glasgow, Coal & Iron National Bank; 400 bg., Bremen, Lehn & Fink; 80 carboys, Rotterdam, Roessler & Hasslacher Chemical Co.; 20 csk., Rotterdam, H. A. Metz Lab.; 154 pkg., Rotterdam, H. Kastor; 12 bbl., Havre, Wallerstein Laboratories.

CHROME ORE—491 tons, Delagoa Bay, Irving Bank-Col. Trust Co.; 426 tons, Delagoa Bay, Order.

COLORS—15 cs. earth, Hamburg, C. J. Osborn Co.; 38 csk. do., Hamburg, Reichard-Coulston, Inc.; 25 csk. do., Hamburg, J. Lee Smith & Co.; 9 cs. do., Hamburg, Order; 29 csk., Bremen, Fezandie & Sperrle; 30 csk. aniline, Havre, Ciba Co.; 3 csk. do., Havre, Carbic Color & Chemical Co.; 18 pkg., Havre, Geigy Co.; 13 csk. ultramarine blue, Glasgow, A. Maharrie; 37 csk. earth, Bremen, Fezandie & Sperrle; 11 csk. do., Bremen, L. H. Butcher & Co.; 4 csk. indigo paste and 8 pkg. aniline, Rotterdam, Kuttroff, Pickhardt & Co.; 2 csk. aniline, Rotterdam, Garfield Aniline Works; 3 csk. do., Rotterdam, A. H. Meyer; 4 csk. dry, Rotterdam, G. A. Kuhl; 11 pkg. aniline, Rotterdam, Bank of the Manhattan Co.; 17 pkg. do., Rotterdam, H. A. Metz & Co.; 5 bbl. ultramarine, Rotterdam, A. Hurst & Co.; 6 pkg. vermilion, London, Pomeroy & Fischer; 3 keg aniline, Liverpool, Bernard, Judae & Co.

COPPER OXIDE—95 dr., Hamburg, C. B. Richard & Co.; 20 dr., Hamburg, Order.

DEXTRINE—100 bg., Rotterdam, Commonwealth Import Corp.; 100 bg., Rotterdam, Spier, Simmons & Co.

EPSOM SALT—150 bg., Hamburg, Order.

FLUORSPAR—50,900 kilos, Hamburg, C. Hardy, Inc.; 266 bg. and 84 bbl., Hamburg, Roessler & Hasslacher Chemical Co.

GAMBIER—263 cs., Singapore, Order.

GLYCERINE — 10 dr. crude, Antwerp, Brown Bros. & Co.

GUMS—200 cs. damar, Batavia, Bank of the Manhattan Co.; 105 cs. do., Singapore, Baring Bros. & Co.; 50 bg. copal, Singapore, Chemical National Bank; 110 bg. copal, Antwerp, Chase National Bank; 38 bg. do., Antwerp, Order; 13 bg. copal, London, Kentler Bros.; 183 bg. copal, Sorabaya, Order; 50 cs. damar, Batavia, Bank of the Manhattan Co.; 100 cs. do., Batavia, W. Schall & Co.; 500 cs. do., Batavia, Order; 100 cs. do., Padang, Order.

IRON OXIDE — 9 csk., Liverpool, Reichard-Coulston, Inc.; 20 csk., Liverpool, L. H. Butcher & Co.; 100 csk., Liverpool, J. Lee Smith & Co.

Opportunities in the Foreign Trade

Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.

AMMONIA SULPHATE, phosphate rock, sodium nitrate, potassium chloride and copper sulphate. Palermo, Italy. Purchase and agency.—10,817.

ASBESTINE, Hamburg, Germany. Purchase.—10,762.

BENZOL, Asuncion, Paraguay. Purchase or agency.—10,721.

LINSEED OIL, Vienna, Austria. Purchase.—10,814.

SODA CAUSTIC, soda ash, and sodium silicate. Iquique, Chile. Purchase.—10,784.

ZINC WHITE, Vienna, Austria. Purchase.—10,815.

LOGWOOD EXTRACT—270 bbl., Cape Haiti, Logwood Mfg. Co.; 20 csk., Montego Bay, J. Campbell Co.

LITHOPONE—1,000 csk., Antwerp, B. Moore & Co.; 50 csk. Antwerp, A. Maharrie; 100 bbl., Rotterdam, Innis, Speiden & Co.

MAGNESITE — 313 bg., Rotterdam, Speiden, Whitfield Co.; 18,160 bg. lump, Madras, Order.

MAGNESIUM CHLORIDE — 633 dr., Hamburg, Order; 695 dr., Hamburg, Hansa Co.; 368 dr. and 5 bg. Hamburg, Innis, Speiden & Co.

MANGROVE BARK—500 bg., Singapore, Order; 2,696 bg., Majunga, National City Bank.

MYROBALANS — 3,295 bg., Coconada, Order.

NAPHTHALENE—202 bg. crude, Hamburg, Order.

NICKEL SULPHATE—50 csk., Havre, Gallagher & Ascher.

OILS — Coconut — 720 tons (in bulk), Cebu, Philippine Refining Co.; 782 tons (in bulk), Manila, Spencer, Kellogg & Sons; 845 tons (in bulk), Cebu, Philippine Refining Co.; 94 bbl., Colombo, Order. **Cod** —25 csk., St. Johns, R. Badcock & Co.; 10 csk., St. Johns, Bowring & Co. **Linseed** —100 bbl., Rotterdam, Cheesman, Elliott Co. **Peanut**—291 csk., Bordeaux, American Shipping Co. **Poppyseed**—2 bbl., London, F. Stearns & Co.

OIL SEEDS—Copra—309 bg., Trinidad, Order. **Castor**—68 bg., Port de Paix, H. Mann & Co. **Linseed**—8,947 bg., Rosario, American Linseed Co.; 13,942 bg., Buenos Aires, L. Dreyfus & Co.; 34,695 bg., Buenos Aires, Order; 42,490 bg. Rosario, American Linseed Co.

POTASSIUM SALTS — 130 dr. caustic, Hamburg, Superfos Co.; 61 dr. do., Hamburg, A. Klipstein & Co.; 300 csk. chlorate, Hamburg, E. Suter & Co.; 50 dr. caustic, Hamburg, Peters, White & Co.; 30 csk. salts, Hamburg, Roessler & Hasslacher Chemical Co.; 32 csk. do., Hamburg, A. Klipstein & Co.; 166 bg. muriate, Antwerp, Society Comm. des Potasses d'Alsace; 2,000 bg. muriate, Bremen, Potash Importing Co. of America; 5 pkg. chlorate, Havre, C. Hardy, Inc.

PYRIDINE—5 dr., Hamburg, Order.

PYRITES — 5,993,600 kilos (in bulk), Huelva, The Pyrites Co.

QUEBRACHO—18,436 bg., Buenos Aires, Tannin Corp.; 10,000 bg., Buenos Aires, First National Bank of Boston; 11,225 bg., Buenos Aires, Tannin Corp.

SHELLAC — 8 cs., Rotterdam, C. F. Gerlach; 934 bg., Havre, Davies, Turner & Co.; 113 bg., Singapore, Standard Bank of Am.; 400 bg., Calcutta, Brunswick, Balke, Collender Co.

SILVER SULPHIDE — 96 cs., Antofagasta, Watson, Geach & Co.

SODIUM SALTS — 30,467 bg. nitrate, Iquique, Wessel, Duval & Co.; 13,400 bg. do., Iquique, E. I. du Pont de Nemours & Co.; 15 csk. fluoride, Hamburg, Mechanics & Metals National Bank; 52 dr. sulphite, Hamburg C. S. Grant & Co.; 38 csk. yellow prussiate, Rotterdam, Meteor Products Co.; 27 csk. prussiate, Rotterdam, A. Klipstein & Co.; 94 csk. do., Rotterdam, Meteor Products Co.; 23 csk. prussiate, Liverpool, C. Tennant Sons & Co.; 20 cs. peroxide, Havre, C. Hardy, Inc.; 24,866 bg. nitrate, Iquique, W. R. Grace & Co.

TALC—200 bg., Bordeaux, C. B. Chrystal & Co.; 200 bg., Bordeaux, Whittaker, Clark & Daniels; 200 bg., Bordeaux L. A. Salomon & Bros.; 35 pkg., Bordeaux, Order.

TETRACHLORATHAN — 54 dr., Hamburg, Roessler & Hasslacher Chemical Co.; 8 dr. do., Hamburg, Innis, Speiden & Co.

TARTAR—92 bg., Bordeaux, Order.

TURMERIC—193 bg., Madras, Order; 828 bg., Colombo, Order; 264 bg., Alleppy, Order.

VANADIUM—5,600 bg., Callao, Vanadium Corp.

VALONEA — 336 bg., Constantinople, Order.

WATTLE BARK—3,743 bg., Natal, Tannin Corp.; 2,818 bg., Natal, Smith & Kirkpatrick Co.; 9,701 bg., Morondava, Order.

WAXES — 375 bg. montan, Hamburg, Strohmeyer & Arpe; 225 bg. do., Hamburg, Order; 11 bg. bayberry, Southampton, Michelson & Sternberg; 35 cs. beeswax, Rotterdam, Order; 13 bg. beeswax, Alexandria, Bank of America; 35 bg. beeswax, Talcahuano W. R. Grace & Co.; 33 bg. do., Coquimbo, South Am. Bank; 29 bg. do., Valparaiso, Strohmeyer & Arpe.

WHITING — 5,149 bg. powdered, Dunkirk, Taintor Trading Co.

WOOL GREASE — 100 bbl., Bremen, American Trust Co.; 30 bbl., Bremen, Order.

ZINC CARBONATE—12 csk., Bremen, Hans Hinrich Chemical Corp.

ZINC OXIDE—100 csk., Antwerp, E. M. & F. Waldo.

Current Prices in the New York Market

For Chemicals, Oils and Allied Products

THESE prices are for the spot market in New York City, but a special effort has been made to report American manufacturers' quotations whenever available. In many cases these are for material f.o.b. works or on a contract basis and these prices are so designated. Quotations on imported stocks are reported when they are of sufficient importance to have a material effect on the market. Prices quoted in these columns apply to large quantities in original packages.

General Chemicals

Acetone, drums, wks.	lb.	$0.15 - $0.15½
Acetic anhydride, 85%, dr.	lb.	.38 - ....
Acid, acetic, 28%, bbl.	100 lb.	3.12 - 3.37
Acetic, 56%, bbl.	100 lb.	5.85 - 6.10
Acetic, 80%, bbl.	100 lb.	8.19 - 8.44
Glacial, 99½%, bbl.	100 lb.	11.01 - 11.51
Boric, bbl.	lb.	.09 - .09½
Citric, kegs	lb.	.46 - .46½
Formic, 85%	lb.	.12½- .13
Gallic, tech.	lb.	.45 - .50
Hydrofluoric, 52%, carboys	lb.	.11 - .12
Lactic, 44%, tech., light, bbl.	lb.	.12½- .13
22% tech., light, bbl.	lb.	.06 - .06½
Muriatic, 18° tanks	100 lb.	.80 - .85
Muriatic, 20°, tanks	100 lb.	.95 - 1.00
Nitric, 36°, carboys	lb.	.04 - .04½
Nitric, 42°, carboys	lb.	.04½- .05½
Oleum, 20%, tanks	ton	16.00 - 17.00
Oxalic, crystals, bbl.	lb.	.09½- .10
Phosphoric, 50% carboys	lb.	.07 - .08
Pyrogallic, resublimed	lb.	1.55 - 1.60
Sulphuric, 60°, tanks	ton	9.00 - 10.00
Sulphuric, 60°, drums	ton	13.00 - 14.00
Sulphuric, 66°, tanks	ton	14.00 - 15.00
Sulphuric, 66° drums	ton	18.00 - 19.00
Tannic, U.S.P., bbl.	lb.	.65 - .70
Tannic, tech., bbl.	lb.	.45 - .50
Tartaric, imp., powd., bbl.	lb.	.27 - .28
Tartaric, domestic, bbl.	lb.	.30 - ....
Tungstic, per lb.	lb.	1.20 - 1.25
Alcohol, butyl, drums, f.o.b. works	lb.	.25 - .30
Alcohol ethyl (Cologne spirit), bbl.	gal.	4.83 - ....
Ethyl, 190 p'f. U.S.P., bbl.	gal.	4.81 - ....
Alcohol, methyl (see Methanol)		
Alcohol, denatured, 190 proof		
No. 1, special bbl.	gal.	.48 - .49
No. 1, 190 proof, special, dr.	gal.	.42 - ...
No. 1, 188 proof, bbl.	gal.	.51 - ...
No. 1, 188 proof, dr.	gal.	.45 - ...
No. 5, 188 proof, bbl.	gal.	.47 - .48
No. 5, 188 proof, dr.	gal.	.41 - ...
Alum, ammonia, lump, bbl.	lb.	.03½- .04
Potash, lump, bbl.	lb.	.02¾- .03½
Chrome, lump, potash, bbl.	lb.	.05½- .06
Aluminum sulphate, com., bags	100 lb.	1.35 - 1.40
Iron free bags	lb.	2.35 - 2.45
Aqua ammonia, 26°, drums	lb.	.06½- .06¾
Ammonia, anhydrous, cyl.	lb.	.28 - .30
Ammonium carbonate, powd. tech., casks	lb.	.12 - .13
Ammonium nitrate, tech., casks	lb.	.09 - .10
Amyl acetate tech., drums	gal.	3.00 - ....
Antimony oxide, white, bbl.	lb.	.10 - .10½
Arsenic, white, powd., bbl.	lb.	.07¾- .08¼
Arsenic, red, powd., kegs	lb.	.14¾- .15¼
Barium carbonate, bbl.	ton	61.00 - 62.00
Barium chloride, bbl.	ton	79.00 - 82.00
Barium dioxide, 88%, drums	lb.	.17½- .18
Barium nitrate, casks	lb.	.08½- .08¾
Blanc fixe, dry, bbl.	lb.	.03¾- .04
Bleaching powder, f.o.b. wks., drums	100 lb.	1.90 - ....
Spot N. Y. drums	100 lb.	2.20 - 2.25
Borax, bbl.	lb.	.05 - .05½
Bromine, cases	lb.	.34 - .38
Calcium acetate, bags	100 lb.	3.00 - 3.05
Calcium arsenate, dr.	lb.	.09½- .09¾
Calcium carbide, drums	lb.	.05 - .05½
Calcium chloride, fused, dr. wks.	ton	21.00 - ....
Gran. drums works	ton	27.00 - ....
Calcium phosphate, mono, bbl.	lb.	.06½- .07½
Camphor, Jap. cases	lb.	.71 - .72
Carbon bisulphide, drums	lb.	.06 - .06½
Carbon tetrachloride, drums	lb.	.07 - .07½
Chalk, precip.—domestic, light, bbl.	lb.	.04½- .04½
Domestic, heavy, bbl.	lb.	.03¾- .04
Imported, light, bbl.	lb.	.04½- .05
Chlorine, liquid, tanks, wks.	lb.	.04½- ....
Contract, tanks, wks.	lb.	.04½- ....
Cylinders, 100 lb., wks.	lb.	.05½- .07½
Chloroform, tech., drums	lb.	.30 - .32
Cobalt, oxide, bbl.	lb.	2.10 - 2.25
Copperas, bulk, f.o.b. wks.	ton	16.00 - 18.00
Copper carbonate, bbl.	lb.	.15½- .16
Copper cyanide, drums	lb.	.45 - .46
Coppersulphate, dom., bbl.	100 lb.	4.40 - 4.60
Imp bbl	100 lb.	4.25 - ....
Cream of tartar bbl.	lb.	.20½- .21
Epsom salt, dom., tech., bbl.	100 lb.	1.75 - 2.00
Epsom salt, imp., tech., bags	100 lb.	1.15 - 1.25
Epsom salt, U.S.P., dom., bbl.	100 lb.	2.10 - 2.35
Ether, U.S.P., dr concent'd.	lb.	.13 - .14
Ethyl acetate, 85%, drums.	gal.	.92 - .95
Ethyl acetate, 99%, dr.	gal.	$1.08 - $1.10
Formaldehyde, 40%, bbl	lb.	.09 - .09½
Fullers earth—f.o.b. mines	ton	7.50 - 18.00
Furfural, works, bbl.	lb.	.25 - ....
Fusel oil, ref., drums	gal.	2.75 - 3.50
Fusel oil, crude, drums	gal.	2.00 - 2.25
Glaubers salt, wks., bags	100 lb.	1.20 - 1.40
Glaubers salt, imp., bags	100 lb.	.90 - .95
Glycerine, c.p., drums extra	lb.	.16½- .16¾
Glycerine, dynamite, drums	lb.	.16½- ....
Glycerine, crude 80%, loose	lb.	.10½- .10¾
Hexamethylene, drums	lb.	.65 - .70
Lead:		
White, basic carbonate, dry, casks	lb.	.09¾- ....
White, basic sulphate, casks	lb.	.09½- ....
White, in oil, kegs	lb.	.11½- .12½
Red, dry, casks	lb.	.10½- ....
Red, in oil, kegs	lb.	.12¼- .13½
Lead acetate, white crys., bbl.	lb.	.14½- ....
Brown, broken, casks	lb.	.13½- ....
Lead arsenate, powd., bbl.	lb.	.16 - .18
Lime-Hydrated, bg, wks.	ton	10.50 - 12.50
Bbl., wks.	ton	18.00 - 19.00
Lime, Lump, bbl.	280 lb.	3.63 - 3.65
Litharge, comm., casks	lb.	.10 - .10½
Lithopone, bags	lb.	.06½- .06¾
Magnesium carb., tech., bags	lb.	.08½- .08½
Methanol, 95%, bbl.	gal.	.74 - .76
Methanol, 97%, bbl.	gal.	.76 - .78
Methanol, pure, tanks	gal.	.75 - ....
drums	gal.	.78 - .80
bbl.	gal.	.83 - .85
Methyl-acetone, t'ks.	gal.	.70 - .75
Nickel salt, double, bbl.	lb.	.09 - .10½
Nickel salts, single, bbl.	lb.	.10 - .11
Orange mineral, csk.	lb.	.13½- .14½
Phosgene	....	.60 - .75
Phosphorus, red, cases	lb.	.70 - .75
Phosphorus, yellow, cases	lb.	.37½- .40
Potassium bichromate, casks	lb.	.09½- .09½
Potassium bromide, gran., bbl.	lb.	.22 - .38
Potassium carbonate, 80-85%, calcined, casks	lb.	.05½- .05¾
Potassium chlorate, powd.	lb.	.07½- .08¼
Potassium cyanide, drums	lb.	.47 - .52
Potassium, first sorts, cask	lb.	.07¾- .08
Potassium hydroxide (caustic potash) drums	lb.	.06½- .06¾
Potassium iodide, cases	lb.	3.65 - 3.75
Potassium nitrate, bbl.	lb.	.06 - .07½
Potassium permanganate, drums	lb.	.14 - .14½
Potassium prussiate, red, casks	lb.	.35 - .38
Potassium prussiate, yellow, casks	lb.	.18½- .18¾
Salammoniac, white, gran., casks, imported	lb.	.06½ - .06¾
Salammoniac, white, gran., bbl., domestic	lb.	.07½- .08
Gray, gran., casks	lb.	.08 - .09
Salsoda, bbl.	100 lb.	1.20 - 1.40
Salt cake (bulk) works	ton	16.00 - 18.00
Soda ash, light, 58% flat, bulk, contract	100 lb.	1.25 - ....
bags, contract	100 lb.	1.38 - ....
Soda ash, dense, bulk, contract, basis 58%	100 lb.	1.35 - ....
bags, contract	100 lb.	1.45 - ....
Soda, caustic, 76%, solid, drums contract	100 lb.	3.10 - ....
Soda, caustic, ground and flake, contracts, dr.	100 lb.	3.50 - 3.85
Soda, caustic, solid, 76% f. a. s. N. Y.	100 lb.	2.90 - 3.05
Sodium acetate, works, bbl.	lb.	.04½- .05
Sodium bicarbonate, bulk	100 lb.	1.75 - ....
330-lb. bbl.	100 lb.	2.00 - ....
Sodium bichromate, casks	lb.	.07¼- .07¾
Sodium bisulphate (niter cake)	ton	6.00 - 7.00
Sodium bisulphite, powd., U.S.P., bbl.	lb.	.04½- .04¾
Sodium chlorate, kegs	lb.	.06½- .07
Sodium chloride	long ton	12.00 - 13.00
Sodium cyanide, cases	lb.	.19 - .22
Sodium fluoride, bbl.	lb.	$0.08½- $0.10
Sodium hyposulphite, bbl.	lb.	.02½- .02¾
Sodium nitrite, casks	lb.	.08½- .08¾
Sodium peroxide, powd., cases	lb.	.23 - .27
Sodium phosphate, dibasic, bbl.	lb.	.03½- .03¾
Sodium prussiate, yel. bbl.	lb.	.09½- .10½
Sodium salicylic, drums	lb.	.38 - .40
Sodium silicate (40°, drums)	100 lb.	.75 - 1.15
Sodium silicate (60°, drums)	100 lb.	1.75 - 2.00
Sodium sulphide, fused, 60-62% drums	lb.	.03½- .03¾
Sodium sulphite, crys., bbl.	lb.	.02½- .03
Strontium nitrate, powd., bbl.	lb.	.09½- .10
Sulphur chloride, yel drums	lb.	.04½- .05
Sulphur, crude	ton	18.00 - 20.00
At mine, bulk	ton	16.00 - 18.00
Sulphur, flour, bag	100 lb.	2.25 - 2.35
Sulphur, roll, bag	100 lb.	2.00 - 2.10
Sulphur dioxide, liquid, cyl.	lb.	.08 - .08
Tin bichloride, bbl.	lb.	.12¾- ....
Tin oxide, bbl.	lb.	.48 - ....
Tin crystals, bbl.	lb.	.33 - ....
Zinc carbonate, bags	lb.	.12 - .14
Zinc chloride, gran, bbl.	lb.	.05½- .07½
Zinc cyanide, drums	lb.	.36½- .37
Zinc dust, bbl	lb.	.08 - .08½
Zinc oxide, lead free, bag	lb.	.07½- ....
5% lead sulphate, bags	lb.	.07½- ....
10 to 35 % lead sulphate, bags	lb.	.07 - ....
French, red seal, bags	lb.	.09½- ....
French, green seal, bags	lb.	.10½- ....
French, white seal, bbl.	lb.	.12 - ....
Zinc sulphate, bbl.	100 lb.	3.00 - 3.25

Coal-Tar Products

Alpha-naphthol, crude, bbl.	lb.	$0.60 - $0.65
Alpha-naphthol, ref., bbl.	lb.	.65 - .75
Alpha-naphthylamine, bbl.	lb.	.35 - .36
Aniline oil, drums	lb.	.16 - .16½
Aniline salt, bbl.	lb.	.22 - .23
Anthracene, 80%, drums	lb.	.70 - .75
Anthraquinone, 25%, paste, drums	lb.	.75 - .80
Benzaldehyde U.S.P., carboys	lb.	1.50 - ....
f.f.c. drums	lb.	1.60 - ....
tech, drums	lb.	68 .72
Benzene, pure, water-white, tanks, works	gal.	.25 - ....
Benzene, 90%, tanks, works	gal.	.23 - ....
Benzidine base, bbl.	lb.	.80 - .82
Benzidine sulphate, bbl.	lb.	.70 - .72
Benzoic acid, U.S.P., kegs	lb.	.75 - .85
Benzoate of soda, U.S.P., bbl.	lb.	.65 - .70
Benzyl chloride, 95-97%, ref. carboys	lb.	.35 - ....
Benzyl chloride, tech., drums	lb.	.25 - ....
Beta-naphthol, tech., bbl.	lb.	.24 - .25
Beta-naphthylamine, tech.	lb.	.65 - .70
Cresol, U.S.P., drums	lb.	.22 - .26
Ortho-cresol, drums	lb.	.28 - .32
Cresylic acid, 97%, works drums	gal.	.63 - .67
95-97%, drums, works	gal.	.58 - .61
Dichlorbenzene, drums	lb.	.07 - .08
Diethylaniline, drums	lb.	.53 - .58
Dimethylaniline, drums	lb.	.36 - .38
Dinitrobenzene, bbl.	lb.	.15 - .17
Dinitrochlorbenzene, bbl.	lb.	.21 - .22
Dinitronaphthalene, bbl.	lb.	.30 - .32
Dinitrophenol, bbl.	lb.	.35 - .40
Dinitrotoluen, bbl.	lb.	.18 - .20
Dip oil, 25%, drums	gal.	.26 - .28
Diphenylamine, bbl.	lb.	.48 - .50
H-acid, bbl.	lb.	.72 - .75
Meta-phenylenediamine, bbl.	lb.	.95 - 1.00
Michlers ketone, bbl.	lb.	3.00 - 3.25
Monochlorbenzene, drums	lb.	.08 - .10
Monoethylaniline, drums	lb.	1.20 - 1.30
Naphthalene, flake, bbl.	lb.	.04¾- .05½
Naphthalene, balls, bbl.	lb.	.05½- .05¾
Naphthionate of soda, bbl.	lb.	.60 - .65
Naphthionic acid, crude, bbl.	lb.	.60 - .62
Nitrobenzene, drums	lb.	.09 - .09½
Nitro-naphthalene, bbl.	lb.	.25 - .30
Nitro-toluene, drums	lb.	.13½- .14
N-W acid, bbl.	lb.	1.00 - 1.05
Ortho-amidophenol, kegs	lb.	2.40 - 2.50
Ortho-dichlorbenzene, drums	lb.	.12 - .13
Ortho-nitrophenol, bbl.	lb.	1.25 - 1.30
Ortho-nitrotoluene, drums	lb.	.11 - .12
Ortho-toluidine, bbl.	lb.	.12 - .13
Para-aminophenol, base, kegs	lb.	1.15 - 1.20
Para-aminophenol, HCl, kegs	lb.	1.30 - 1.40
Para-dichlorbenzene, bbl.	lb.	.17 - .20
Paranitraniline, bbl.	lb.	.68 - .70
Para-nitrotoluene, bbl.	lb.	.52 - .56
Para-phenylenediamine, bbl.	lb.	1.35 - 1.45
Para-toluidine, bbl	lb.	.72 - .80
Phthalic anhydride, bbl.	lb.	.30 - .34
Phenol, U.S.P., dr.	lb.	.26 - .27½
Picric acid, bbl.	lb.	.20 - .22
Pitch, tanks, works	ton	25.00 - 30.00
Pyridine, imp., drums	gal.	4.00 - 4.25
Resorcinol, tech., kegs	lb.	1.30 - 1.40

Resorcinol, pure, kegs	lb.	$2.00	$2.25
R-salt, bbl	lb.	.50	.55
Salicylic acid, tech., bbl	lb.	.32	.33
Salicylic acid, U.S.P., bbl	lb.	.35	....
Solvent naphtha, water-white, tanks	gal.	.25	....
Crude, tanks	gal.	.22	....
Sulphanilic acid, crude, bbl	lb.	.16	.18
Tolidine, bbl	lb.	1.00	1.05
Toluidine, mixed, kegs	lb.	.30	.35
Toluene, tank cars, works	gal.	.26	....
Toluene, drums, works	gal.	.30	....
Xylidine, drums	lb.	.48	.50
Xylene, 5 deg.-tanks	gal.	.40	....
Xylene, com., tanks	gal.	.28	....

Naval Stores

Rosin B-D, bbl	280 lb.	$5.50	$5.55
Rosin E-I, bbl	280 lb.	5.65	5.70
Rosin K-N, bbl	280 lb.	5.90	6.10
Rosin W.G.-W.W., bbl	280 lb.	7.00	7.60
Wood rosin, bbl	280 lb.	5.40	5.50
Turpentine, spirits of, bbl	gal.	.84	.85
Wood, steam dist., bbl	gal.	.75	.76
Wood, dest. dist., bbl	gal.	.58	.60
Pine tar pitch, bbl	200 lb.	5.50	....
Tar, kiln burned, bbl	500 lb.	10.50	....
Retort tar, bbl	500 lb.	10.50	....
Rosin oil, first run, bbl	gal.	.38	....
Rosin oil, second run, bbl	gal.	.43	....
Rosin oil, third run, bbl	gal.	.48	....
Pine oil, steam dist	gal.	.60	....
Pine tar oil, com'l	gal.	.30	....

Animal Oils and Fats

Degras, bbl	lb.	$0.03½	$0.05½
Grease, yellow, loose	lb.	.06½	.07
Lard oil, Extra No. 1, bbl	gal.	.85	....
Lard compound, bbl	lb.	.12½	.12¾
Neatsfoot oil 20 deg. bbl	gal.	1.26	....
No. 1, bbl	gal.	.86	.88
Oleo Stearine		.12½	....
Oleo oil, No. 1, bbl	lb.	.13½	....
Red oil distilled, d.p. bbl	lb.	.08½	.09
Saponified, bbl	lb.	.08½	.09
Tallow, extra, loose works	lb.	.07½	....
Tallow oil, acidless, bbl	gal.	.82	....

Vegetable Oils

Castor oil, No. 3, bbl	lb.	$0.15½	......
Castor oil, No. 1, bbl	lb.	.16	......
Chinawood oil, bbl	lb.	.12	.12½
Coconut oil, Ceylon, bbl	lb.	.09½	.09¾
Ceylon, tanks, N.Y.	lb.	.08½	......
Coconut oil, Cochin, bbl	lb.	.10	.10¼
Corn oil, crude, bbl	lb.	.11½	.11¾
Crude, tanks, (f.o.b. mill)	lb.	.09½	......
Cottonseed oil, crude (f.o.b. mill), tanks	lb.	.09½	.09½
Summer yellow, bbl	lb.	.11½	.11¾
Winter yellow, bbl	lb.	.12	.12¼
Linseed oil, raw, car lots, bbl.	gal.	.96	......
Raw, tank cars (dom.)	gal.	.90	......
Boiled, cars, bbl. (dom.)	gal.	.98	......
Olive oil, denatured, bbl	gal.	1.15	1.20
Sulphur, (foots) bbl	lb.	.09½	.09½
Palm, Lagos, casks	lb.	.07½	......
Niger, casks	lb.	.07½	......
Palm kernel, bbl	lb.	.09	.09½
Peanut oil, crude, tanks (mill)	lb	.11½	......
Peanut oil, refined, bbl	lb.	.14½	.15
Perilla, bbl	lb.	.14	.14½
Rapeseed oil, refined, bbl	gal.	.78	.80
Sesame, bbl	lb.	.11	.11½
Soya bean (Manchurian), bbl.	lb.	.11½	.11½
Tank, f.o.b. Pacific coast	lb.	.10½	....
Tank, (f.o.b. N.Y.)	lb.	.10½	....

Fish Oils

Cod, Newfoundland, bbl	gal.	$0.60	$0.62
Menhaden, light pressed, bbl.	gal.	.56	....
White bleached, bbl	gal.	.58	....
Blown, bbl	gal.	.62	....
Crude, tanks (f.o.b. factory)	gal.	.40	....
Whale No. 1 crude, tanks, coast	lb.	......	....
Winter, natural, bbl	gal.	.75	.76
Winter, bleached, bbl	gal.	.78	.79

Oil Cake and Meal

Coconut cake, bags	ton	$28.00	29.00
Cottonseed meal, f.o.b. mills	ton	38.00	40.00
Linseed cake, bags	ton	36.00	37.00
Linseed meal, bags, spot	ton	40.00	41.00

Dye & Tanning Materials

Albumen, blood, bbl	lb.	$0.50	$0.55
Albumen, egg, tech, kegs	lb.	.95	.97
Cochineal, bags	lb.	.33	.35
Cutch, Borneo, bales	lb.	.04½	.04¾
Cutch, Rangoon, bales	lb.	.13½	.14½
Dextrine, corn, bags	100 lb.	3.92	4.19
Dextrine gum, bags	100 lb.	4.22	4.29
Divi-divi, bags	ton	40.00	42.00
Fustic, sticks	ton	30.00	35.00
Fustic, chips, bags	lb.	.04	.05
Gambier com., bags	lb.	.12½	.13
Logwood, sticks	ton	25.00	26.00
Logwood, chips, bags	lb.	.02½	.03
Sumac, leaves, Sicily, bags	ton	165.00	170.00
Sumac, ground, bags	ton	155.00	160.00
Sumac, domestic, bags	ton	50.00	55.00
Starch, corn, bags	100 lb.	3.27	3.54
Tapioca flour, bags	lb.	.04½	.06

Extracts

Archil, conc., bbl	lb.	$0.16	$0.19
Chestnut, 25% tannin, tanks	lb.	.01½	.02
Divi-divi, 25% tannin, bbl	lb.	.04½	.05½
Fustic, crystals, bbl	lb.	.20	.22
Fustic, liquid, 42°, bbl	lb.	.08	.09
Gambier, liq., 25% tannin, bbl.	lb.	.11	.11½
Hematine crys., bbl	lb.	.14	.18
Hemlock, 25% tannin, bbl	lb.	.03½	.04
Hypernic, solid, drums	lb.	.22	.24
Hypernic, liquid, 51°, bbl	lb.	.12	.13
Logwood, crys., bbl	lb.	.14	.15
Logwood, liq., 51°, bbl	lb.	.07½	.08½
Osage Orange, 51°, liquid, bbl.	lb.	.07	.08
Osage Orange, powder, bg	lb.	.14	.15
Quebracho, solid, 65% tannin, bbl	lb.	.04½	.04¾
Sumac, dom., 51°, bbl	lb.	.06½	.07

Dry Colors

Blacks-Carbongas, bags, f.o.b. works, contract	lb.	$0.09	$0.11
spot, cases	lb.	.12	.16
Lampblack, bbl	lb.	.12	.40
Mineral, bulk	ton	35.00	45.00
Blues-Bronze, bbl	lb.	.38	.40
Prussian, bbl	lb.	.38	.40
Ultramarine, bbl	lb.	.08	.35
Browns, Sienna, Ital., bbl	lb.	.06	.14
Sienna, Domestic, bbl	lb.	.03½	.04
Umber, Turkey, bbl	lb.	.04	.04½
Greens-Chrome, C.P. Light, bbl	lb.	.28	.30
Chrome, commercial, bbl	lb.	.11½	.12
Paris, bulk	lb.	.24	.26
Reds, Carmine No. 40, tins	lb.	4.25	4.50
Iron oxide red, casks	lb.	.08	.12
Para toner, kegs	lb.	.95	1.00
Vermilion, English, bbl	lb.	1.30	1.35
Yellow, Chrome, C.P. bbls	lb.	.17	.17½
Ocher, French, casks	lb.	.02½	.03

Waxes

Bayberry, bbl	lb.	$0.21	$0.21½
Beeswax, crude, Afr. bg	lb.	.26	.27
Beeswax, refined, light, bags	lb.	.32	.34
Beeswax, pure white, cases	lb.	.40	.41
Candellila, bags	lb.	.23	.23½
Carnauba, No. 1, bags	lb.	.40	.40½
No. 2, North Country, bags	lb.	.29	.30
No. 3, North Country, bags	lb.	.22	.23
Japan, cases	lb.	.21	.21½
Montan, crude, bags	lb.	.05¾	.06
Paraffine, crude, match, 105-110 m.p., bbl	lb.	.05½	....
Crude, scale 124-126 m.p. bags	lb.	.04½	....
Ref., 118-120 m.p., bags	lb.	.04¾	....
Ref., 123-125 m.p., bags	lb.	.05	....
Ref, 128-130 m.p., bags	lb.	.05½	.05¾
Ref., 133-135 m.p., bags	lb.	.06½	.07
Ref., 135-137 m.p., bags	lb.	.07½	.08
Stearic acid, sgle pressed, bags	lb.	.10½	....
Double pressed, bags	lb.	.11	....
Triple pressed, bags	lb.	.12½	....

Fertilizers

Acid phosphate, 16%, bulk, works	ton	$7.50	$7.75
Ammonium sulphate, bulk f.o.b. works	100 lb.	2.50	....
Blood, dried, bulk	unit	4.10	4.15
Bone, raw, 3 and 50, ground	ton	26.00	28.00
Fish scrap, dom., dried, wks	unit	....	......
Nitrate of soda, bags	100 lb.	2.60	....
Tankage, high grade, f.o.b. Chicago	unit	2.50	....
Phosphate rock, f.o.b. mines			
Florida pebble, 68-72%	ton	3.25	3.70
Tennessee, 75%	ton	6.75	7.00
Potassium muriate, 80%, bags	ton	34.55	....
Potassium sulphate, bags basis 90%	ton	45.85	....
Double manure salt	ton	26.35	....
Kainit	ton	7.22	....

Crude Rubber

Para—Upriver fine	lb.	$0.20½	....
Upriver coarse	lb.	.14	....
Upriver caucho ball	lb.	.14	....
Plantation—First latex crepe	lb.	.19¾	....
Ribbed smoked sheets	lb.	.18¾	....
Amber crepe No. 1	lb.	.18½	.18¾

Gums

Copal, Congo, amber, bags	lb.	$0.09	$0.14
East Indian, bold, bags	lb.	.13	.14
Manila, pale, bags	lb.	.18	.19
Pontinak, No. 1 bags	lb.	.19	.20
Damar, Batavia, cases	lb.	.23	.23½
Singapore, No. 1, cases	lb.	.27	.27½
Singapore, No. 2, cases	lb.	.18½	.19
Kauri, No. 1, cases	lb	.58	.64
Ordinary chips, cases	lb.	.21	.22
Manjak, Barbados, bags	lb.	.06	.09

Shellac

Shellac, orange fine, bags	lb.	$0.55	$0.56
Orange superfine, bags	lb.	.57	.58
A. C. garnet, bags	lb.	.52	....
Bleached, bonedry	lb.	.63	.64
Bleached, fresh	lb.	.52	.53
T. N., bags	lb.	.53	.54

Miscellaneous Materials

Asbestos, crude No. 1, f.o.b., Quebec	sh ton	$300.00	$400.00
Asbestos, shingle, f.o.b. Quebec	sh. ton	50.00	70.00
Asbestos, cement, f.o.b., Quebec	sh ton	20.00	25.00
Barytes, grd., white, f.o.b. mills, bbl	net ton	16.00	17.00
Barytes, grd., off-color, f.o.b. Balt	net ton	13.00	14.00
Barytes, floated, f.o.b. St. Louis, bbl	net ton	23.00	24.00
Barytes, crude f.o.b. mines, bulk	net ton	8.00	9.00
Casein, bbl., tech	lb.	.10½	.12
China clay (kaolin) crude, No. 1, f.o.b. Ga	net ton	7.00	8.00
Washed, f.o.b. Ga	net ton	8.50	9.00
Powd., f.o.b. Ga	net ton	14.00	20.00
Crude f.o.b. Va	net ton	6.00	8.00
Ground, f.o.b. Va	net ton	13.00	19.00
Imp., lump, bulk	net ton	15.00	20.00
Imp., powd	net ton	45.00	50.00
Feldspar, No. 1 f.o.b. N.C.	long ton	7.00	7.50
No. 2 f.o.b. N.C.	long ton	4.50	5.00
No. 1 gr'd. N. C.	long ton	15.32	21.00
No. 1 Canadian, f.o.b. mill, powd	long ton	20.00	....
Graphite, Ceylon, lump, first quality, bbl	lb.	.05½	.06
Ceylon, chip, bbl	lb.	.04½	.05
High grade amorphous crude	ton	15.00	35.00
Gum arabic, amber, sorts, bags	lb.	.11¾	.12
Gum tragacanth, sorts, bags	lb.	.48	.50
No. 1, bags	lb.	1.20	....
Kieselguhr, f.o.b. Cal	ton	40.00	42.00
F.o.b. N. Y	ton	50.00	55.00
Magnesite, calcined, f.o.b. Cal.	ton	35.00	45.00
Pumice stone, imp., casks	lb.	.03	.40
Dom., lump, bbl	lb.	.06	.08
Dom., ground, bbl	lb.	.03	.05
Silica, glass sand, f.o.b. Ind	ton	2.00	2.50
Silica, sand blast, f.o.b. Ind	ton	2.25	3.50
Silica, amorphous, 200-mesh, f.o.b. Ill	ton	20.00	....
Silica, glass sand, f.o.b. Ill	ton	2.00	2.50
Soapstone, coarse, f.o.b. Vt., bags	ton	7.50	8.00
Talc, 200 mesh, f.o.b., Vt., bags, extra	ton	10.50	....
Talc, 200 mesh, f.o.b. Ga., bags	ton	8.00	10.00
Talc, 325 mesh, f.o.b. New York, grade A bags	ton	14.75	....

Mineral Oils

Crude, at Wells

Pennsylvania	bbl.	$3.25	$3.75
Corning	bbl.	1.90	......
Cabell	bbl.	1.70	......
Somerset	bbl.	1.80	......
Illinois	bbl.	2.07	......
Indiana	bbl.	2.08	......
Kansas and Okla. under 28 deg.	bbl.	.90	......
California, 35 deg. and up	bbl.	1.40	......

Gasoline, Etc.

Motor gasoline, steel bbls	gal.	$0.20	......
Naphtha, V. M. & P. deod, steel bbls	gal	.19	......
Kerosene, ref. tank wagon	gal.	.14	......
Bulk, W.W. delivered, N.Y.	gal.	.08	......
Lubricating oils:			
Cylinder, Penn., filtered	gal.	.30	.35
Bloomless, 30@31 grav	gal.	.21	.22
Paraffin, pale 885 vis	gal.	.16	.17
Spindle, 200, pale	gal.	.22	......
Petrolatum, amber, bbls	lb.	.04½	.04¾
Paraffine wax (see waxes)			

Refractories

Bauxite brick, 56% Al_2O_3, f.o.b. Pittsburgh	1,000	$140-$145
Chrome brick, f.o.b. Eastern shipping points	ton	45-47
Chrome cement, 40-50% Cr_2O_3	ton	23-27
40-45% Cr_2O_3, sacks, f.o.b. Eastern shipping points	ton	23.00
Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks	1,000	42-45
2nd. quality, 9-in. shapes, f.o.b. wks	1,000	35-38
Magnesite brick, 9-in. straight (f.o.b. wks.)	ton	65-68
9-in. arches, wedges and keys	ton	80-85
Scraps and splits	ton	85
Silica brick, 9-in. sizes, f.o.b. Chicago district	1,000	48-50
Silica brick, 9-in. sizes, f.o.b. Birmingham district	1,000	48-50
F.o.b. Mt. Union, Pa	1,000	38-40
Silicon carbide refract. brick, 9-in.	1,000	1,180.00

Ferro-Alloys

Ferrotitanium, 15-18% f.o.b. Niagara Falls, N.Y.	ton	$200.00	......

Ferrochromium, per lb. of Cr, 1-2% C	lb.	$0 30 -	....
4-6% C	lb.	.11½-	....
Ferromanganese, 78-82% Mn, Atlantic seabd. duty paid	gr. ton	107.50 -	....
Spiegeleisen, 19-21% Mn	gr. ton	35.00 -	36.00
Ferromolybdenum, 50-60% Mo, per lb. Mo	lb.	2.00 -	2.25
Ferrosilicon, 10-12%	gr. ton	39.50 -	43.50
50%	gr. ton	75.00 -	.....
Ferrotungsten, 70-80%, per lb. of W	lb.	.90 -	.93
Ferro-uranium, 35-50%, of U, per lb. of U	lb.	4.50 -	....
Ferrovanadium, 30-40%, per lb. of V	lb.	3.50 -	4.00

Ores and Semi-finished Products

Bauxite, dom. crushed, dried, f.o.b. shipping points	ton	$5.50 -	$8.75
Chrome ore Calif. concentrates, 50% min. Cr_2O_3	ton	22.00 -	....
C.i.f. Atlantic seaboard	ton	19 50 -	24.00
Coke, fdry., f.o.b. ovens	ton	4.50 -	5.00
Coke, furnace, f.o.b. ovens	ton	3.25 -	3.40
Fluorspar, gravel, f.o.b. mines, Illinois	ton	23.50 -	....
Ilmenite, 52% TiO_2 Va.	lb.	.01½-	....
Manganese ore, 50% Mn, c.i.f. Atlantic seaport	unit	.42 -	.46
Manganese ore, chemical (MnO_2)	ton	75.00 -	80.00
Molybdenite, 85% MoS_2, per lb. MoS_2, N. Y.	lb.	.80 -	....
Monazite, per unit of ThO_2, c.i.f., Atl. seaport	lb.	.06 -	.08
Pyrites, Span., fines, c.i.f. Atl. seaport	unit	.11½-	.12
Pyrites, Span., furnace size, c.i.f. Atl. seaport	unit	.11½-	.12
Pyrites, dom. fines, f.o.b. mines, Ga.	unit	.12 -	....
Rutile, 94@96% TiO_2	lb.	.12 -	.15
Tungsten, scheelite, 60% WO_3 and over	unit	9.25 -	....
Tungsten, wolframite, 60% WO_3	unit	9.00 -	9.25
Uranium ore (carnotite) per lb. of U_3O_8	lb.	3.50 -	3.75
Uranium oxide, 96% per lb. U_3O_8	lb.	12.25 -	2.50
Vanadium pent oxide, 99%	lb.	2.00 -	14.00
Vanadium ore, per lb. V_2O_5	lb.	1.00 -	1.25
Zircon, 99%	lb.	.06 -	.07

Non-Ferrous Metals

Copper, electrolytic	lb.	$0.12⅜- $0.12½
Aluminum, 98 to 99%	lb.	.27 - .28
Antimony, wholesale, Chinese and Japanese	lb.	.08⅜- .08½
Nickel, 99%	lb.	.27 - .30
Monel metal, shot and blocks	lb.	.32
Tin, 5-ton lots, Straits	lb.	.44½
Lead, New York, spot	lb.	.07
Lead, E. St. Louis, spot	lb.	.0670
Zinc, spot, New York	lb.	.0615
Zinc, spot, E. St. Louis	lb.	.0580
Silver (commercial)	oz.	.66½
Cadmium	lb.	.60
Bismuth (500 lb. lots)	lb.	2.40-2.45
Cobalt	lb.	2.50-3.00
Magnesium, ingots, 99%	lb.	.90-.95
Platinum, refined	oz.	116.00
Iridium	oz.	260.00-270.00
Palladium	oz.	78.00-83.00
Mercury	75 lb.	73.00-74.00
Tungsten powder	lb.	.95-1.00

Finished Metal Products

	Warehouse Price Cents per Lb.
Copper sheets, hot rolled	18.25
Copper bottoms	28.00
Copper rods	18.75
High brass wire	16.75
High brass rods	14.00
Low brass wire	18.50
Low brass rods	19.50
Brazed bronze tubing	23.75
Seamless copper tubing	21.75
Seamless high brass tubing	20.50

OLD METALS—The following are the dealers purchasing prices in cents per pound

Copper, heavy and crucible	9.50 @ 9.75
Copper, heavy and wire	9.25 @ 9.37½
Copper, light and bottoms	7.50 @ 7.75
Lead, heavy	5.50 @ 5.75
Lead, tea	3.50 @ 3.62½
Brass, heavy	4.75 @ 5.00
Brass, light	4.00 @ 4.25
No. 1 yellow brass turnings	6.00 @ 6.25
Zinc scrap	3.37½ @ 3.50

Structural Material

The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses in the cities named:

	New York	Chicago
Structural shapes	$3.44	$3.44
Soft steel bars	3.34	3.34
Soft steel bar shapes	3.54	3.54
Soft steel bands	4.09	4.09
Plates, ¼ to 1 in. thick	3.44	3.44

Technical Societies, Trade Associations and Commercial Organizations

This compilation of technical and commercial organizations in the chemical engineering and related fields should prove valuable as a reference directory. An effort has been made in each case to give the name and address of the secretary or other responsible official. Additions or corrections should be sent to the Editor, *Chemical & Metallurgical Engineering*, Tenth Ave. at 36th St., New York City.

Amer. Assn. for the Advancement of Science. Sec., Dr. Burton E. Livingston, Smithsonian Inst. Bldg., Washington, D. C.

Amer. Assn. of Cereal Chemists. Sec., R. K. Durham, 440 N. Y. Life Bldg., Kansas City, Mo.

Amer. Assn. of Engrs. Sec., C. D. Drayer, 63 East Adams St., Chicago, Ill.

Amer. Assn. of Flint and Lime Glass Mfrs. Sec., John Kunzler, House Bldg., Pittsburgh, Pa.

Amer. Assn. of Ice & Refrigeration Engrs. Sec., L. C. Smith, 163 W. Washington St., Chicago, Ill.

Amer. Assn. of Operating Engrs. Sec., H. C. Bristol, Calderwood, Tenn.

Amer. Assn. of Refrigeration. Sec., J. F. Nickerson, 421 S. Dearborn St., Chicago, Ill.

Amer. Assn. of Textile Chemists & Colorists. Sec., Walter E. Hadley, 5 Mountain Ave., Maplewood, N. J.

Amer. Bakers Assn. Sec., Dr. H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

Amer. Ceramic Society. Sec., Ross C. Purdy, Lord Hall, Ohio State Univ., Columbus, Ohio.

American Chemical Society. Sec., Dr. Charles L. Parsons, 1709 G St., N. W., Washington, D. C.

Amer. Concrete Institute. Sec., Harvey Whipple, 1807 E. Grand Blvd., Detroit, Mich.

Amer. Concrete Pipe Assn. Sec., M. W. Loving, 111 W. Washington St., Chicago, Ill.

Amer. Electrochemical Soc. Sec., Dr. C. G. Fink, Columbia Univ., New York.

Amer. Electro-Platers' Soc. Sec., Frank J. Hanlon, 216 N. Jefferson St., Chicago, Ill.

Amer. Engineering Standards Committee. Sec., P. G. Agnew, 29 W. 39th St., New York.

Amer. Face Brick Assn. Sec., R. D. T. Hollowell, 130 N. Wells St., Chicago, Ill.

Amer. Foundrymen's Assn. Sec., C. E. Hoyt, 1012 Marquette Bldg., Chicago, Ill.

Amer. Gas Assn. Sec.-Mgr., Alexander Forward, 342 Madison Ave., New York.

Amer. Gear Manufacturers Assn. Sec., T. W. Owen, Room 107, 2443 Prospect Ave., Cleveland, Ohio.

Amer. Inst. of Baking. Director, Dr. H. E. Barnard, 1135 Fullerton Ave., Chicago, Ill.

Amer. Inst. of Chemical Engrs. Sec., Dr. J. C. Olsen, Polytechnic Inst., Brooklyn, N. Y.

Amer. Inst. of Chemists. Pres., Prof. H. G. Byers, Cooper Union, New York.

Amer. Inst. of Consulting Engrs. Sec., Col. F. A. Molitor, 143 Liberty St., New York.

Amer. Inst. of Electrical Engrs. Sec., F. L. Hutchinson, 33 W. 39th St., New York.

Amer. Inst. of Fertilizer Chemists. Sec.-Treas., W. J. Gascoyne, Jr., 27 S. Gay St., Baltimore, Md.

Amer. Inst. of Mining & Metallurgical Engrs. Sec., Frederick F. Sharpless, 29 W. 39th St., New York.

Amer. Iron & Steel Institute. Sec., E. A. S. Clarke, 40 Rector St., New York.

Amer. Leather Chemists Assn. Sec., H.

Amer. Malleable Castings Assn. Sec.-Treas., Robert E. Belt, 1900 Euclid Bldg., Cleveland, Ohio

American Management Assn., 20 Vesey St., New York.

American Manufacturers of Toilet Articles. Sec., C. M. Baker, c/o Ponds Extract Co., 131 Hudson St., New York.

Amer. Manufacturers' Export Assn. Sec., Maurice B. Bean, 160 Broadway, New York.

Amer. Mining Congress. Sec., J. F. Callbreath, 841 Munsey Bldg., Washington, D. C.

American Museum of Safety. Director, Albert A. Hopkins, 141 E. 29th St., New York.

Amer. Oil Chemists' Society. Sec., Thomas B. Caldwell, Wilmington, N. C.

Amer. Paper & Pulp Assn. Exec. Sec., Hugh P. Baker, 18 East 41st St., New York.

Amer. Peat Soc. Sec.-Treas., Charles Knap, 2 Rector St., New York.

Amer. Petroleum Inst. Sec., R. L. Welch, 15 W. 44th St., New York.

Amer. Physical Soc. Sec., Harold W. Webb, Columbia Univ., New York.

Amer. Pig Iron Assn. Sec., John A. Penton, Penton Bldg., Cleveland, Ohio.

Amer. Pulp & Paper Mill Superintendents Assn. Sec., R. L. Eminger, Miamisburg, O.

Amer. Society of Agricultural Engrs. Sec., Raymond Olney, Mt. Clemens, Mich.

Amer. Society of Civil Engrs. Sec., John H. Dunlap, 29 W. 39th St., New York.

Amer. Soc. for Heating & Ventilating Engrs. Sec., F. C. Houghten, 29 W. 39th St., New York.

Amer. Soc. of Mechanical Engrs. Sec., Calvin W. Rice, 29 W. 39th St., New York.

Amer. Soc. of Refrigerating Engrs. Sec., William H. Ross, 35 Warren St., New York.

Amer. Soc. of Safety Engrs. Sec., Gene S. Wood, 29 W. 39th St., New York.

Amer. Soc. for Steel Treating. Sec., W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio.

Amer. Soc. for Testing Materials. Sec.-Treas., C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

Amer. Welding Soc. Sec., Miss M. M. Kelly, 33 W. 39th St., New York.

Amer. Wood-Preservers' Assn. Sec., P. R. Hicks, 1146 Otis Bldg., Chicago, Ill.

Amer. Zinc Inst., Inc. Sec., Stephen S. Tuthill, 27 Cedar St., New York.

Associated Cooperage Industries of Amer. Sec., C. G. Hirt, B-20 Railway Exchange Bldg., St. Louis, Mo.

Associated Corn Products Manufacturers. Sec., Dr. W. P. Cutler, 208 So. La Salle St., Chicago, Ill.

Associated Tile Mfrs. Sec., F. W. Walker, Beaver Falls, Pa.

Assn. of Amer. Steel Manufacturers. Sec., J. O. Leech, c/o Carnegie Steel Co., Pittsburgh, Pa.

Assn. of British Chemical Mfrs., Gen.-Mgr. & Sec., W. J. U. Woolcock, 166 Piccadilly, London, W. 1, England.

Assn. of Iron and Steel Electrical Engrs. Sec., John F. Kelly, 708 Empire Bldg., Pittsburgh, Pa.

Assn. of Official Agricultural Chemists. Sec., W. W. Skinner, Box 290 Pennsylvania Ave. Station, Washington, D. C.

Assn. of Scientific Apparatus Makers of the U. S. A. Sec., J. M. Roberts, 460 E. Ohio St., Chicago, Ill.

Assn. of Wood Using Industries. Sec., William B. Baker, 531 Monadnock Bldg., Chicago, Ill.

Biscuit & Cracker Mfrs. Assn. Sec., R. T. Stokes, 90 West Broadway, New York.

British Assn. for the Advancement of Science. Sec., O. J. R. Howarth, Burlington House, Piccadilly, London, W. 1, England.

British Cast Iron Research Assn. Sec., Thomas Vickers, Central House, New St., Birmingham, England.

British Non-Ferrous Metal Research Assn. Sec., Dr. R. S. Hutton, Athenaeum Chambers, 71, Temple Row, Birmingham, England.

Bureau of Raw Materials for American Vegetable Oils & Fats Industries. Sec., John B. Gordon, 944 Munsey Bldg., Washington, D. C.

Canadian Engineering Standards Assn. Sec., R. J. Durley, 638-9 Jackson Bldg., Ottawa, Ont., Canada.

Canadian Inst. of Chemistry. Sec., L. E. Westman, 57 Queen St., W., Toronto, Ont., Canada.

Canadian Inst. of Mining & Metallurgy. Sec., G. C. Mackenzie, 603 Drummond Bldg., 511 St. Catherine St., W., Montreal, Canada.

Canadian National Clay Products Assn. Sec., Gordon C. Keith, 435 Grace St., Toronto, Ont., Canada.

Canadian Pulp & Paper Assn. Sec., Edward Beck, Room 701, Drummond Bldg., 511 St. Catherine St., W., Montreal, Que., Canada.

Canadian Society of Forest Engrs. Sec., Roland D. Craig, Journal Bldg., Ottawa, Canada.

Ceramic Society. Sec., Dr. J. W. Mellor, Central Science School, Stoke-on-Trent, England.

Cercle de la Chimie. Pres., P. Blondel, 54 Rue de Turbigo, Paris, France.

Chemical Equipment Assn. Sec., Roberts Everett, 1328 Broadway, New York.

Chemical, Metallurgical & Mining Society of South Africa, Inc. Sec., H. A. G. Jeffreys, Scientific & Technical Club, 100 Fox St., Johannesburg, Transvaal, South Africa.

Chemists' Club. Sec., H. G. Sidebottom, 52 E. 41st St., New York.

Circle of Scientific, Technical & Trade Journalists. Hon Sec., Leon Gaster, 32 Victoria St., Westminster, London, S. W. 1, England.

Clay Products Assn. Sec., George C. D. Lenth, Chamber of Commerce Bldg., Chicago, Ill.

Common Brick Mfrs. Assn. of Amer. Sec., Ralph P. Stoddard, 2121 Cleveland, Discount Bldg., Cleveland, Ohio.

Compressed Air Society. Sec., C. H. Rohrbach, 50 Church St., New York.

Compressed Gas Mfrs. Assn. Sec., John H. Hayes, 120 W. 42nd St., New York.

Copper & Brass Research Assn. Sec., George A. Sloan, 25 Broadway, New York.

Cost Assn. of the Paper Industry. Sec.-Treas., Thomas J. Burke, 18 East 41st St., New York.

Deutsche Chem. Ges. Sec., Dr. H. Jost, Sigismundstr, 4, W. 10, Berlin, Germany.

Deutsche Zuckerindustrie, Dessauer Str., 18, Berlin, S.W. 11, Germany.

Domestic Sugar Producers' Conference. Sec., E. W. Mayo, 135 Front St., New York.

Drop Forge Supply Assn. Pres., Hollinshead N. Taylor, 300 Chestnut St., Philadelphia, Pa.

Eastern Clay Products Assn. Sec., H. T. Shelley, 906 Colonial Trust Bldg., Philadelpiha, Pa.

Eastern States Blast Furnace and Coke Oven Assn. Sec., Dan M. Rugg, Buffalo, N. Y.

Edible Gelatin Manufacturers of America, Inc. Sec., H. B. Sweatt, 81 Fulton St., New York.

Enameled Sanitary Mfgrs. Assn. Sec., George D. McIlvaine, 909 Oliver Bldg., Pittsburgh, Pa.

Engineering Foundation. Director, Alfred D. Flinn, 29 W. 39th St., New York.

Engineering Inst. of Canada. Sec., Fraser S. Keith, 176 Mansfield St., Montreal, Que., Canada.

Faraday Society. 10 Essex St., Strand, London, W. C. 2, England.

Federated Amer. Engineering Societies. Sec., L. W. Wallace, 26 Jackson Pl., Washington, D. C.

Franklin Inst. of the State of Pa. Sec., Dr. R. B. Owens, 15 S. 7th St., Philadelphia, Pa.

Gas Products Assn. Sec. and Treas., C. T. Price, 140 South Dearborn St., Chicago, Ill.

Glass Container Assn. Sec., R. E. Walker, c/o Turner Bros. Co., Terre Haute, Ind.

Hawaiian Sugar Planters' Assn., P. O. Box 411, Honolulu, Hawaii.

Gypsum Industries. Sec.-Treas., H. H. Macdonald, 844 Rush St., Chicago, Ill.

Illuminating Engineering Society. Gen. Sec., Norman D. MacDonald, Electrical Testing Co., 80th St. and East End Ave., New York.

Insecticide & Disinfectant Mfrs. Assn., Inc. Acting Sec., H. W. Cole, Holbrook, Mass.

Institute of Amer. Meat Packers. Pres., C. E. Herrick, 509 S. Wabash Ave., Chicago, Ill.

Institute of Makers of Explosives. Sec., C. Stewart Comeaux, 103 Park Ave., New York.

Institute of Margarin Manufacturers. Sec., Dr. J. S. Abbott, 1049 Munsey Bldg., Washington, D. C.

Institute of Metals. Sec., G. Shaw Scott, 36 Victoria St., Westminster, London, S. W. 1, England.

Institute of Radio Engineers. Sec., Dr. Alfred N. Goldsmith, College of the City of New York.

Institution of Engineers & Shipbuilders in Scotland. Sec., Edward H. Parker, Elmbank, Crescent, Glasgow, Scotland.

Institution of Mining & Metallurgy. Sec., Charles McDermid, Cleveland House, 225 City Road, London, E. C. 1, England.

Institution of Petroleum Technologists. Sec., Commander R. E. Stokes-Rees, Aldine House, Bedford St., Strand, London, W. 2, England.

Instituto Cientifico e Industrial del Salitre. Gen. Sec., Belisario Diaz Ossa. Casilla 2730, Santiago, Chile.

International Acetylene Assn. Sec.-Treas., A. Cressy Morrison, 30 E. 42nd St., New York.

Interstate Cotton Seed Crushers' Assn., Inc. Sec., Robert Gibson, 201 N. Texas Bldg., Dallas, Tex.

Inventors' League of the U. S., 114 Maiden Lane, New York.

Iron & Steel Institute. Sec., G. C. Lloyd, 28 Victoria St., London, S. W. 1, England.

Magnesia Assn. of America. 246 N. 17th St., Philadelphia, Pa.

Manufacturing Chemists Assoc. of the U. S. Sec., J. I. Tierney, 540 Woodward Bldg., Washington, D. C.

Metric Assn. Sec., Howard Richards, 156 5th Ave., New York.

Mining & Metallurgical Soc. of Amer. Sec., Donald M. Liddell, 2 Rector St., New York.

Mirror Mfrs. Assn. Sec., H. C. Sorden, Shelbyville, Ind.

National Academy of Sciences. Sec., David White, Geological Survey, Washington, D. C.

National Assn. of Cost Accountants. Sec., Stuart C. McLeod, 130 W. 42nd St., New York.

National Assn. of Cotton Mfrs. Sec., Harry C. Meserve, 45 Milk St., Boston, Mass.

National Assn. of Glue & Gelatin Mfrs. Sec., H. B. Sweatt, 81 Fulton St., New York.

National Association of Importers of Hides & Skins, Inc. Exec. Sec., John R. Arnold, 15 Park Row, New York.

National Assn. of Leather Belting Mfrs. Sec., George H. Blake, P. O. Box 859, City Hall Sta., New York.

National Assn. of Mfrs. of Pressed & Blown Glassware. Sec., John Kunzler, House Bldg., Pittsburgh, Pa.

National Assn. of Mfrs. of the U. S. of Amer. Sec., George S. Boudinot, 50 Church St., New York.

National Assn. of Oxy-Chloride Cement Mfgrs. Sec.-Treas., Robert W. Page, 461 8th Ave., New York.

National Assn. of Practical Refrigerating Engrs. Sec., E. H. Fox, 5707 West Lake St., Chicago, Ill.

National Assn. of Purchasing Agents. Sec., W. L. Chandler, 19 Park Place, New York.

National Assn. of Sheet & Tin Plate Mfrs. Sec.-Treas., Walter W. Lower, 421 Oliver Bldg., Pittsburgh, Pa.

National Assn. of Window Glass Mfrs. Sec., J. R. Johnston, Jr., 1701 First National Bank Bldg., Pittsburgh, Pa.

Natl. Bottle Mfrs. Assn. Sec., W. B. Swindell, c/o Swindell Bros., Baltimore, Md.

National Brick Manufacturers' Assn. Sec., Theodore A. Randall, 211 Hudson St., Indianapolis, Ind.

National Canners' Assn. Sec., Frank E. Gorrell, 1739 H Street, N.W., Washington, D. C.

National Coal Assn. Exec. Sec., H. L. Gandy, 801 Southern Bldg., Washington, D. C.

National Conference of Business Paper Editors. Sec., Alfred G. Oehler, c/o *Railway Electrical Engineer*, 30 Church St., New York.

National Elec. Light Assn. Exec. Mgr., M. H. Aylesworth, 29 W. 39th St., New York.

National Fertilizer Assn. Sec., John D. Toll, c/o *American Fertilizer*, 1010 Arch St., Philadelphia, Pa.

National Fire Protection Assn. Sec., Franklin H. Wentworth, 40 Central St., Boston, Mass.

National Foreign Trade Council. Sec., O. K. Davis, 1 Hanover Sq., New York.

National Gas Products Assn. Asst. Sec., A. T. Kitchel, 41 E. 42nd St., New York.

National Industrial Conference Board. Comptroller, James M. Robertson, 10 E. 39th St., New York.

National Industrial Council. Sec. and Treas., Earl Constantine, 50 Church St., New York.

National Institute of Inventors. Sec., R. Nerenstone, 8 E. 14th St., New York.

National Lime Assn. Gen. Mgr., Burton A. Ford, 918 G St., N.W., Washington, D. C.

National Lumber Manufacturers Assn. of Chicago. Sec., Wilson Compton, Transportation Bldg., Washington, D. C.

National Metal Trades Assn. L. W. Fischer, 1019 Peoples Gas Bldg., Chicago, Ill.

National Ornamental Glass Mfrs. Assn. of U. S. & Canada. Sec., A. J. Schuler, 625 Jackson Blvd., Chicago, Ill.

National Paint, Oil & Varnish Assn. Sec., G. V. Horgan, 18 East 41st St., New York.

National Paving Brick Mfrs. Assn. Sec., Edward E. Duff, Jr., Engineers Bldg., Cleveland, Ohio.

National Petroleum Assn. C. D. Chamberlin, 823 Guardian Bldg., Cleveland, Ohio.

National Petroleum Marketers Assn. Pres., L. V. Nicholas, 76 W. Monroe St., Chicago, Ill.

National Pipe & Supplies Assn. Sec., Geo. D. McIlvaine, 908 Oliver Bldg., Pittsburgh, Pa.

National Research Council. Sec., Dr. Vernon Kellogg, 1701 Massachusetts Ave., Washington, D. C.

National Safety Council. Sec., W. H. Cameron, 168 N. Michigan Ave., Chicago, Ill.

National Varnish Mfgrs. Assn. Sec., G. B. Heckel, 509 The Bourse, Philadelphia, Pa.

National Wood Chemical Assn. Sec.-Treas., F. J. Goodfellow, 76 Main St., Bradford, Pa.

Natural Gas Assn. of America. Sec., William B. Way, 905 Oliver Bldg., Pittsburgh, Pa.

New Jersey Chemical Society. Sec., Frederick W. Zons, 367 High St., Newark, N. J.

New Jersey Clay Workers Assn. & Eastern Section of the American Ceramic Society. Sec., G. H. Brown, Ceramics Dept., Rutgers College, New Brunswick, N. J.

New York Academy of Sciences. Sec., Dr. Ralph W. Tower, 77th St. and Central Park West, New York City.

Oil & Colour Chemists' Assn. Sec., H. A. Carwood, 53 Groombridge Rd., London, E. 9, England.

Paint Mfgrs.' Assn. of the U. S. Sec., G. B. Heckel, 509 The Bourse, Philadelphia, Pa.

Plate Glass Mfrs. of Amer. Sec., P. A. Hughes, First National Bank Bldg., Pittsburgh, Pa.

Portland Cement Assn. Sec.-Gen. Mgr., William M. Kinney, 111 W. Washington St., Chicago, Ill.

Refractories Manufacturers Assn. Sec., Frederic W. Donahoe, 840 Oliver Bldg., Pittsburgh, Pa.

Rubber Assn. of America. Gen. Mgr. and Sec., 250 West 57th St., New York.

Rubber Growers' Assn., Inc. 2, 3 and 4 Idol Lane, Eastcheap, London, E.C. 3, England.

Salesmen's Assn. of the American Chemical Industry. Sec., A. J. Binder, c/o Sherwin-Williams Co., 115 Broadway, New York.

Salt Producers Assn. Sec., D. B. Doremus, 1246 Penobscot Bldg., Detroit, Mich.

Sand-Lime Brick Assn. Sec., J. S. Palmer, Rebewaing, Mich.

Société de Chimie Industrielle. Sec., Jean Gerard, 49 Rue des Mathurins, Paris, France.

Société d'encouragement pour l'industrie Nationale. 44 rue de Rennes, Paris, France.

Society of Chemical Industry. Sec., J. P. Longstaff, 46 Finsbury Sq., London, E.C. 2, England.

Society of Chemical Industry (N .Y. Section). Sec., Allen Rogers, Pratt Institute, Brooklyn, N. Y.

Society of Dyers & Colourists. Sec., J. B. Atkinson, Pearl Assurance Bldgs., Market St., Bradford, England.

Society of Glass Technology. Sec., S. English, Darnall Road, Sheffield, England.

Society of Industrial Engrs. Exec. Sec., George C. Dent, 608 S. Dearborn St., Chicago, Ill.

Society of Leather Trades Chemists. Sec., W. R. Atkin, University, Leeds, England.

Society for the Promotion of Engineering Education. Sec., Dean F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

South African Chemical Institute. Sec., James Gray, Box 5254, Johannesburg, So. Africa.

South African Institution of Engrs., Inc. Sec., W. W. R. Jago, Box 4609, Johannesburg, So. Africa.

Steel Barrel Mfrs. Assn. Sec., D. S. Hunter, 428 Bulkley Bldg., Cleveland, Ohio.

Structural Steel Society. Sec.-Treas. Chas. O. Baughman, Morava Construction Co., 8457 Stewart Ave., Chicago, Ill.

Synthetic Organic Chem. Mfrs. Assn. of the U. S. Exec. Officer, Dr. Chas. H. Herty, Pres., Room 343, 1 Madison Ave., New York.

Talc & Soapstone Producers Assn. Sec.-Treas., Raymond B. Ladoo, Box 557, Cleveland, Tenn.

Tanners' Council. Sec., E. A. Brand, 41 Park Row, New York.

Taylor Society. Managing Director, Harlow S. Person, 29 W. 39th St., New York.

Technical Assn. of the Pulp & Paper Industry. Sec., W. G. MacNaughton, 18 E. 41st St., New York.

Technical Photographic & Microscopical Soc. Sec.-Treas., Alfred B. Hitchins, c/o Ansco Co., Binghamton, N. Y.

Technical Publicity Assn. Sec., C. L. Packard, Western Electric Co., Room 1414, 100 E. 42nd St., New York.

Textile Alliance. Pres., A. M. Patterson, 45 E. 17th St., New York.

Turpentine and Rosin Producers Assn. Sec., C. F. Speh, Whitney-Central Bldg., New Orleans, La.

Union Internationale de la Chimie Pure et Applique. Sec., Jean Girard, 49 Rue des Mathurins, Paris, France.

United Engineering Society. Sec., Alfred D. Flinn, 29 W. 39th St., New York.

U. S. Potash Producers' Assn. Exec. Sec., Frederick W. Brown, 604 Southern Bldg., Washington, D. C.

U. S. Potters Assn. Sec., Charles F. Goodwin, East Liverpool, Ohio.

U. S. Pulp Producers Assn. Sec., Oliver M. Porter, 18 E. 41st St., New York.

U. S. Sugar Manufacturers Assn. Sec., Harry A. Austin, 901 Union Trust Bldg., Washington, D. C.

Washington Academy of Science. Sec., F. B. Silsbee, Bureau of Standards, Washington, D. C.

Western Petroleum Refiners Assn. Sec., John Reynolds, 304 Inter-State Bldg., Kansas City, Mo.

Industrial

Financial, Construction and Manufacturing News

Construction and Operation

Alabama

ENSLEY—The Steel Cities Chemical Co., Wylam Station, Ensley, has work in progress on extensions and improvements in its plant, including changes in equipment for other process work. The expansion will cost close to $50,000. J. A. Calhoun is chemical engineer in charge.

Arizona

MIAMI — The Inspiration Consolidated Copper Co. is said to have preliminary plans under way for the erection of a new leaching plant at its Live Oak properties for the treatment of carbonate ores, estimated to cost in excess of $75,000, including equipment.

California

SANTA ROSA—Paul Beygrau, Santa Rosa, has selected a site fronting on the line of the Southern Pacific R.R., and plans for the immediate erection of a new plant for the manufacture of sheet plaster, roofing tile and kindred products. The initial works are expected to cost $35,000. It is understood that a company will be organized to operate the mill.

EL CENTRO—The Pacific Portland Cement Co., Consolidated, Pacific Bldg., San Francisco, has acquired the local properties of the Imperial Gypsum Co., and will take immediate possession. Plans are under way for extensive development of a portion of the land, with installation of plant and equipment for this purpose, estimated to cost in excess of $500,000.

OAKLAND — The Pacific Concrete Products Co., lately formed, has commenced operations at a new plant, foot of 48th Ave., and plans to develop maximum capacity in the line of colored concrete brick. A special process department will be operated for color work. It is expected later to install a tile-manufacturing branch.

Connecticut

HIGGANUM—The Tidewater Feldspar Co. plans for the rebuilding of the portion of its plant, destroyed by fire June 23, with loss estimated at $22,000, including equipment.

Florida

MIAMI—The Everglade Paper Co. is reported to have tentative plans for the rebuilding of a portion of its plant recently destroyed by fire. An official estimate of loss has not been announced.

Illinois

ROCK ISLAND—The Servus Rubber Co., 401 Central Park Bldg., has completed plans for the first unit of a new local plant and will begin foundations at an early date. It will be 3-story, 79x150 ft., estimated to cost about $80,000. Cervin & Horn, Safety Bldg., are architects.

Indiana

HOBART—The National Fireproofing Co., Fulton Bldg., Pittsburgh, Pa., manufacturer of hollow tile, etc., plans for extensions and improvements in its local plant, including the installation of additional equipment, estimated to cost about $500,000.

Maryland

HAGERSTOWN—The Central Chemical Co., Franklin M. Thomas, president, has preliminary plans under advisement for the erection of a new 1-story plant on local site, with reported cost placed at $25,000.

Massachusetts

DANVERS—The Standard Crayon Co. will hold in temporary abeyance the erection of its proposed 1-story addition, 40x55 ft., designed for use as a dye house. It is expected to proceed with the work in the near future. Plans have been completed by French & Hubbard, 210 South St., Boston, Mass., architects.

New York

SCHENECTADY—The Mica Insulator Co., 797 Broadway, manufacturer of insulation products, has awarded a contract to Shear & Gorden, 1512 Albany St., for a 2-story addition to its plant, 90x100 ft., estimated to cost $30,000. A portion of the extension will be equipped for a furnace building. Edward G. Atkinson, 426 State St., is architect.

Oklahoma

MUSKOGEE—The City Council is planning for a bond issue of $100,000, the fund to be used for the installation of a filtration plant at the municipal waterworks.

Pennsylvania

YORK—The Peerless Sand Cement Brick Co. will commence the immediate erection of a new local plant for the manufacture of cement brick, blocks, etc., and will install machinery for an initial output of 100,000 pieces per day. M. L. Strayer is president, and J. W. Neuman treasurer, both of York.

Texas

CROSS PLAINS—Fire, June 18, destroyed a portion of the local gasoline-refining plant of the Phillips Petroleum Co., with loss reported at $75,000, including equipment. It is planned to rebuild at an early date. Headquarters of the company are at Bartlesville, Okla.

BASTROP—The Power Oil Co. has preliminary plans under advisement for the reconstruction of its local mill, destroyed by fire, June 20, with loss approximating $60,000, including machinery.

Virginia

COVINGTON—The Hollingsworth & Vose Co., 141 Milk St., Boston, Mass., manufacturer of paper products, has acquired a tract of about 300 acres of land on Dunpals Creek, Covington, and is reported to be planning to use the site for a new paper mill, consisting of a number of units, with estimated cost placed in excess of $1,200,000, with machinery. It is said that plans will be formulated in the near future.

West Virginia

ST. ALBANS—The Virginia Tire & Rubber Co. has plans nearing completion and will soon break ground for the erection of a new plant on site of its former mill at High Lawn, near St. Albans, destroyed by fire a number of months ago. The new plant will provide for increased capacity over the previous plant and will cost in excess of $80,000. G. C. Hedrick is president.

New Companies

UNION ELECTRICAL PORCELAIN WORKS, INC., Trenton, N. J.; electrical porcelain products; $50,000. Incorporators: Joseph W. and Duncan Mackenzie, and John Lund. Representative: Homan & Buchanan, 40 West State St., Trenton.

SPRINGFIELD PAPER SPECIALTIES Co., Springfield, Mass.; paper products; $15,000. George W. Earle is president, and Sidney D. Gilligan, Springfield, treasurer.

ACARICIDE LABORATORIES, INC., 160 North Wells St., Chicago, Ill.; chemicals and kindred specialties; $40,000. Incorporators: George S. Smyth and Clyde F. Dewitt.

WESTERN PACIFIC FERTILIZER Co., Los Angeles, Calif., fertilizer products; $200,000. Incorporators: J. C. Coliman and Samuel Lazaroff, Los Angeles; and R. S. Oppenheim, Santa Ana.

MANGANIFEROUS IRON Co., INC., St. Paul, Minn.; operate iron ore properties; $300,000. Francis D. Butler, 1347 Summit Ave., St. Paul, is the principal incorporator.

ART TILE Co., INC., 200 North 15th St., St. Petersburg, Fla.; ceramic tile products; $25,000. C. S. Moss is president, and W. E. Wakeman secretary and treasurer.

Industrial Notes

THE HILL CLUTCH Co., Cleveland, O., has changed its name to the Hill Clutch Machine & Foundry Co. The operating personnel consists of Harry J. Smith, general manager; M. G. Firestone, treasurer; C. H. Kathe, purchasing agent, and H. F. Corrigan, sales engineer. The change in name is not due to reorganization, but simply to correct an erroneous impression and more thoroughly acquaint the trade with the fact that the company builds not only friction clutches but a complete line of power transmission machinery, automatic belt tighteners, special machinery of all kinds, fine gray iron castings and gear speed transformers.

THE CHAIN BELT Co., Milwaukee, Wis., announces that J. C. Merwin, works manager, was elected second vice-president at the annual meeting of the company. Mr. Merwin is a graduate of Sheffield Scientific School, Yale University (1910), and has been associated with the company since 1917. Other new officers elected were: Brinton Welser as secretary, and C. E. Stone as assistant secretary. The officers reelected were: C. R. Messinger, president; Clifford F. Messinger, first vice-president; C. L. Pfeifer, treasurer.

THE EDWARD VALVE & MFG. Co., East Chicago, Ind., has been represented in the New York district since May 1 by the Dunbar Engineering Co., 50 Church St., New York City.